CENTRAL LAKE ONTARIO CONSERVATION REPORT

FOREST

ONTARIO DEPARTMENT OF PLANNING AND DEVELOPMENT

CONSERVATION BRANCH

CENTRAL LAKE ONTARIO

CONSERVATION REPORT

FOREST

1960

AUTHORSHIP

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TABLE OF CONTENTS

CONTENTS

LIST OF ILLUSTRATIONS, MAPS, GRAPHS AND TABLES

ILLUSTRATIONS

MAPS

GRAPHS

TABLES

RECOMMENDATIONS

STATED OR IMPLIED IN THIS REPORT

1. That a Central Lake Ontario Authority Forest be established and that it be expanded through a definite program of annual additions and planting until as much as is feasible is acquired and reforested of the 11,284 acres of land mapped as suitable for this purpose. p. 23

2. That the Authority encourage private reforestation by providing a planting service at nominal cost and by offering a planting subsidy for trees privately planted. p. 24

3. That the Authority establish woodlot improvement projects on its own properties or on private woodlots under agreements with co-operators in order to demonstrate the advantages of better forestry practices. p. 25

4. That the Authority encourage private owners in thinnings and improvement cuttings in their woodlots by investigating any possible markets for low-grade material and by purchasing any equipment, such as a wood chipper, which might aid woodlot owners in this work. p. 30

5. That the Authority investigate, publicize and urge the implementation of the best methods for protecting woodland from:-

   (a) Grazing p. 35
   (b) Fire p. 37
   (c) Insects and Diseases pp. 37-40

6. That the Authority co-operate with schools, government departments, and all other groups and agencies possible to publicize the need and methods of reforestation and woodlot management; and in particular that the Authority sponsor tours, practical demonstrations and field days for this purpose. p. 28

7. That the Authority encourage and co-operate in research to find improved methods of managing plantations and natural woodlands and publicize results which would help private woodlot owners. p. 27

8. That the Authority encourage landowners to convert to productive forest such parts of the 5,520 acres of scrubland as cannot economically be restored to agricultural use. p. 15

9. That the Authority urge that the Counties of Durham and Ontario adopt tree-cutting by-laws to prevent slashing of woodlots. p. 18

10. That the Authority act as co-sponsors for:

    (a) The Tree Farm movement p. 19
    (b) 4-H Forestry Clubs p. 19

11. That the Authority encourage the establishment of windbreaks, shelterbelts and snow fences. pp. 40-44

12. That the Authority encourage any marketing methods or organizations, including co-operatives, which will increase the owner's interest in better management by securing him a greater return for his woodland produce. pp. 45-57

CHAPTER I

THE FOREST IN THE PAST

1. At the Time of Settlement

Good early descriptions of the forests of Southern Ontario are rare, for the early settler regarded the forest more as an obstacle to cultivation than as a positive asset worthy of recording. However, a fairly good picture may be obtained by piecing together the scattered information which does exist. Such early concern as there was with timber resources centres around pine and oak for the British navy and the easily cut softwoods for building purposes. Fuelwood was important, but was everywhere abundant and not worthy of special note. In addition the type of timber was of indirect interest as an indication of the quality of the land; pine - oak forests indicating light, easily worked soil, and maple - beech stands suggesting richer but heavier soils.

In order to record this information prior to settlement, the early surveyors were instructed as follows;

> "Your field book is to be kept in the accompanying form, comprising the kind and quality of the soil and timber, entering each kind of timber in the order of its relative abundance."

In accordance with these instructions, the surveyors' note-books included a running account of the composition of the forest cover along every line they ran, although unfortunately this record usually was no more than a plain list of species.

From men accustomed to pass without comment through vast stands of virgin forest, even a slight word of commendation indicated fine stands indeed. In this light we may view the description given in 1791 by Augustus Jones as he began at Lake Ontario to run the west boundary of the Township of Darlington; "Timber Oak Basswood, black Birch, Beech and hard Maple large and high."

These species, with some mixture of white pine and hemlock, covered most of the uplands, while cedar and

tamarack stands occupied swamps along the streams, which Jones describes as "Quick and Clear". East of Burketon on the north boundary, he found "Timber all pine and much fallen", a little farther "much scrubed Pine and Poplar", and then some patches of "Meadow or barren".

The failure of the early surveyors to be impressed by timber which today would be considered highly desirable is illustrated by the report of Samuel Wilmot in 1810 regarding the southern edge of Reach Township.

"There are some White and Yellow Pine on the High poor land but good for nothing".

In 1851* the timber between Pickering and Whitby was reported to be "hardwood with a little pine intermixed" and from Oshawa to Bowmanville as "almost altogether hardwood". It is left to our imagination to picture the quality of those fine stands of hardwoods for which the market was not yet ready.

2. Clearing the Land

The attitude of the early settler to the forest was completely hostile. Although the forest supplied his meagre needs for construction material and fuel, this was but a drop in a seemingly limitless sea of supply. Transportation was poor and markets for his woodland produce extremely limited. For agriculture to develop the forest must go, and much of it was simply piled and burned. Settlement duties required a certain amount of land to be cleared before a patent could be obtained, and the progress of a settlement was judged by the amount of land cleared.

As a new area was opened for settlement the best land was naturally taken first and the rough and swampy areas were avoided. Land was cleared first along the fronts of the farms and the woodland cut farther and farther back toward the

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* Smith. W.A. Canada; Past, Present and Future.

REMAINING WOODLAND IN PER CENT

ESTIMATED FROM CENSUS OF CANADA FIGURES

TOWNSHIP	1851	1861	1891	1911	1921	1931	1941	1951
CLARKE	51	37	16	9	9	12	11	11
DARLINGTON	45	37	11	6	8	8	8	9
PICKERING	45	33	8	4	6	6	7	7
REACH	70	53	21	10	9	9	10	10
WHITBY & E. WHITBY	46	38	14	4	4	6	5	7
Total Authority Area	46	37	12	5	6	7	7	8

Note: The recent figures are lower than those found by actual survey, but the table shows the general trend of land clearing.

end of the farm which lay farthest from the road. This was done, in many cases, without reference to the quality of the soil except where it was swampy.

The accompanying table gives an estimate of the remaining woodland at various dates in the townships making up the Central Lake Ontario Watersheds. Although slight irregularities appear in the table, due to incomplete information, the general trend of events is obvious. Until about 1910, the the decrease in woodland was rapid. After that the small remaining area of woodland was at least tolerated, and in some cases has probably shown a slight increase. There is not as yet any evidence of a sharp increase in woodland cover such as might be brought about by a real enthusiasm for reforestation of submarginal lands.

We must not, however, overlook the fact that there were individuals who showed an interest in forest conservation at a relatively early date. It is recorded* that Wm. Windatt sent out the following note while organizing a tree planting day for S.S. No. 9, Darlington, in 1875; "Will you kindly invite through the scholars or otherwise all who are interested in the school to plant a tree or two in the playground during the present week". Among those who cared for their woodlots at this period are mentioned Edward Rutledge of Lot 10, Con. 4, Darlington and Edmund Prout of Lot 7, Con. 3. It is interesting to note that, when the province first started distributing trees in 1905, a plantation was immediately begun on the latter farm by Francis Squair and remains as a fine example of early conservation thought and action.

3. Forest Products

The earliest interest in timber in Ontario was the reservation of pine and oak either by specified areas or by individual marked trees for the use of the British navy. We have no

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* Squire, John. The Townships of Darlington and Clarke.

evidence of specific reserves of this kind in the Central Lake Ontario region, probably because the best pine was so scattered among the hardwoods, but it is quite possible that some of the finest trees found their way to the lake ports and joined rafts such as those which were sent from Port Hope to Montreal.

The square timber trade commenced, no doubt, somewhat later than the mast trade and was carried on simultaneously with it from the thirties.

Square timber was obtained by selecting large trees, mostly white pine, and squaring the best part into one long stick. In the earliest days of the industry the timbers were squared on all four sides to a fine "proud edge", but later, when the best timber had been cut, they were squared with a rounded shoulder or "wane", and were known as "waney timber". Such methods, of course, were wasteful since the finest grained wood was sacrificed in the operation, but this was the type of material called for by the British market.

> "Often only one tree in a thousand would yield a finished 'stick' (so was the heavy square timber nonchalantly called in the trade) fit for export. A good stand might yield thirty or forty trees an acre for over the whole area allowance had to be made for 'wants' - the non-bearing patches of swamp, burn, etc. Today a whole township or limit (in Northern Ontario) may not have one good square stick of the quality of the square timber of another day."*

Until 1890 the Census of Canada lists all pine and oak not sawn into lumber as "square timber", and even as late as 1910 most species are listed as "square, waney or flattened".

As settlement and trade grew, sawmilling became important. It is uncertain when the peak was reached in this industry. Actually it would not be the same in all parts of the watershed. In 1846 the four lakeshore townships from Pickering to Clarke contained 68 sawmills, and the back townships of Uxbridge, Reach and Cartwright, which had been more recently opened, reported 10 sawmills. In the next few years there were slight increases in all these townships.

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* A Hundred Years a/Fellin', written for Gillies Bros Ltd., by Miss Charlotte Whitton.

The variety of wood-using industries in the towns and villages is illustrated by the following list for the year 1846:*

Winchester (Brooklin)	1	Ashery
	1	Tannery
	2	Waggon makers
	3	Coopers
	1	Cabinet maker
Windsor (Whitby)	1	Ashery
	2	Cabinet makers
	1	Chair maker
	1	Fanning mill maker
	2	Waggon makers
Windsor Harbour	1	Wheelwright
	1	Ship carpenter
Oshawa	1	Ashery
	1	Chair factory
	4	Cabinet makers
	3	Waggon makers
Bowmanville	1	Tannery
	1	Axe factory
	1	Ashery
	2	Waggon makers
	1	Chair factory
Columbus	1	Ashery
	2	Waggon makers

The tanneries used oak or hemlock bark and an "ashery" produced crude potash which was shipped to Britain for use in soap making and the dyeing industry. It was extracted from the ashes of hardwood trees, 60 large maple trees producing one barrel of 650 pounds. In the early stages of land clearing this was a source of some revenue, and without roads and factories there was no other market for these trees. However, from the 1840's on increasing amounts of lumber were needed for local building and carriage manufacture, and the potash trade was in a few years on the way out.

By 1850 Brooklin had added 2 saleratus factories and a soap factory to use some of the product of the ashery. Whitby had added a tannery. Bowmanville had added two more tanneries, and Columbus had acquired a tannery and a soap factory.

During this period the local ports showed a corresponding increase in volume and variety of forest exports;

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* Smith, W.A. Canadian Gazeteer.

	1844	1850
WINDSOR HARBOUR (Port Whitby)		
Ashes, barrels	610	549
Saleratus, boxes		153
Lumber, feet	646,000	1,745,004
Panel Doors, cases		52
Shingles, thousands		241
Pipe staves		17,700
West India staves		475,210
Cord Wood, cords		1,200
PORT DARLINGTON (Port of Oshawa)		
Ashes, barrels	143	23
Potash barrels	11	
Lumber, feet	254,000	700,000
Wood, cords		1,000

Fuel wood was used in large quantities, not only for heating homes and public building, but also to power the woodburning vessels and expanding railway systems. At this period, too, lumber was needed for plank roads as well as for building construction, carriages and implements.

For later periods the Census of Canada figures help us trace the changes in forest production and products. While the varying basis used for census returns at different periods makes exact comparison difficult, some general trends are clear from the accompanying tables. The peak production shown for many products is in 1870, 1880 or 1890. Soon after 1900 such products as tanbark, lathwood, masts, staves, shingles and piling drop from the list, and production of other products shows a sharp decline. The one product which has persisted throughout the record is fuelwood, which has dropped from a peak of 207,043 cords in 1880 to a low of 19,280 cords in 1950. This decline reflects both the decrease in available supply and the increasing competition of other fuels.

The addition in 1890 of fence posts, poles and railway ties reflects the development of the area. The introduction of wire fencing, the development of the telephone and

FOREST PRODUCTS - ESTIMATED FROM CENSUS OF CANADA FIGURES

DURHAM COUNTY

Products	Species	Unit	1870	1880	1890	1900	1910	1920	1930	1940	1950
Pulpwood		Cords			27			14	1		
Tanbark		"	349	157	187	75					
Lathwood		"	82	2,000							
Masts & Spars		Number	17	45	141	153					
Staves		"	1,570M	349M		$558					
Fence Rails		"						1,678	3,601		
Fence Posts		"			55,150	28,894	24,191	11,180	20,322		8,954
Poles		"			1,276	1,296	916	306	957		326
Railway Ties		"			400	6,721	275	9,400	170		
Shingles		"			2,300M						
Fuel Wood		Cords	83,131	82,282	51,171	43,270	29,953	26,933	24,835	21,127	6,441
Square Timber & Logs	Ash	Cu. Ft.				2,405					
	Birch & Maple	"	2,000	85	5,700	1,000	3,000				
	Butternut	"		1,080							
	Elm	"	2,840	5,612	2,442	7,515	5,790				
	Oak	"	6,150	10,650	2,225		4,200				
	Pine	"	172,288	80,616	114,992	5,780	23,210				
	Tamarack	"	620	1,872	1,192						
	Others	"	172,391	51,011	37,463	5,098	1,400				
Lumber	Pine	M bd.ft.	7,346	8,240	3,135	3,777	171)	711	774		763
	Others	M bd.ft.	948	2,715	2,199	2,257	793)				
Other Products		$					25	2,902	2,077	5,086*	1,872

* Includes lumber, posts and poles

M = Thousand (1,000)

the expansion of telegraph service all stimulated forest production at this period. The subsequent sharp decline in these products shows the rapid depletion of supplies.

Tamarack was an important timber until 1890 when the species was almost wiped out by the depredations of the larch saw-fly. The amount of walnut and butternut cut was never large, and after 1890 these species disappear from the record.

In 1920 no square timber is shown, and from this time on lumber production is small and is no longer separated by species.

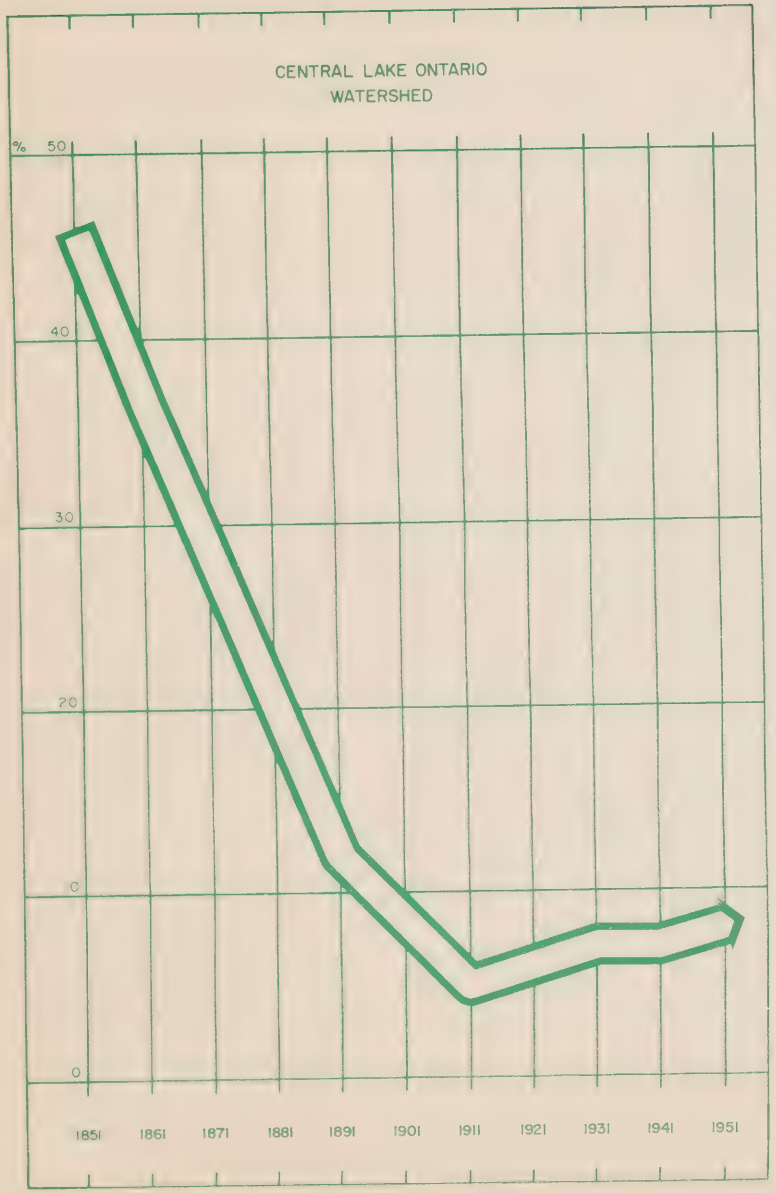
Maple sugar was almost the only sugar available to the pioneers. In 1910 census records begin to list maple syrup as well, indicating the change from a pioneer necessity to a modern luxury. For the sake of comparison the table below shows these products expressed as an equivalent amount of syrup. Production in 1951 was only about ten per cent of that for the peak year of 1861.

MAPLE PRODUCTS OF THE COUNTIES
OF DURHAM AND ONTARIO

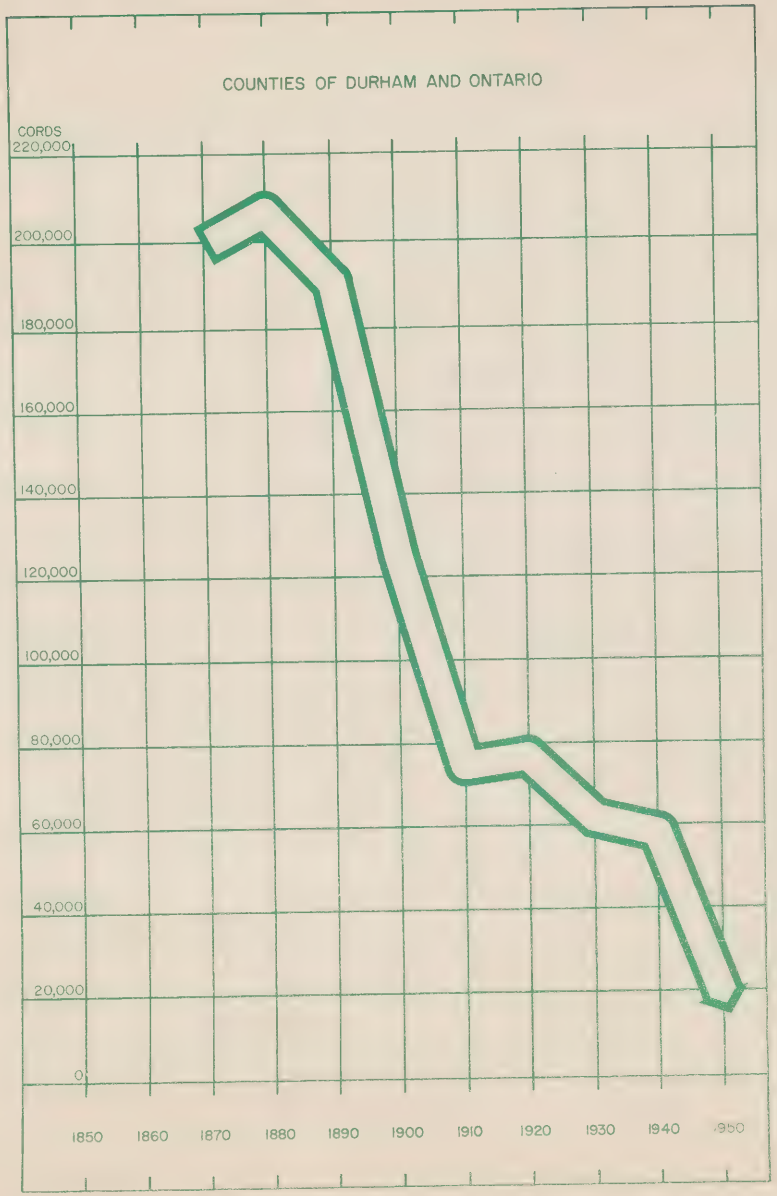
Calculated as Syrup
From Census of Canada Figures

YEAR	DURHAM gallons	ONTARIO gallons	TOTAL gallons
1851	15,074	17,746	32,820
1861	14,116	19,977	34,093
1871	4,732	8,003	12,735
1881	792	2,199	2,991
1891	1,470	5,492	6,962
1901	1,500	2,390	3,890
1911	2,669	2,971	5,640
1921	1,801	3,548	5,349
1931	4,197	3,369	7,566
1941	2,553	1,940	4,493
1951	2,101	1,371	3,472

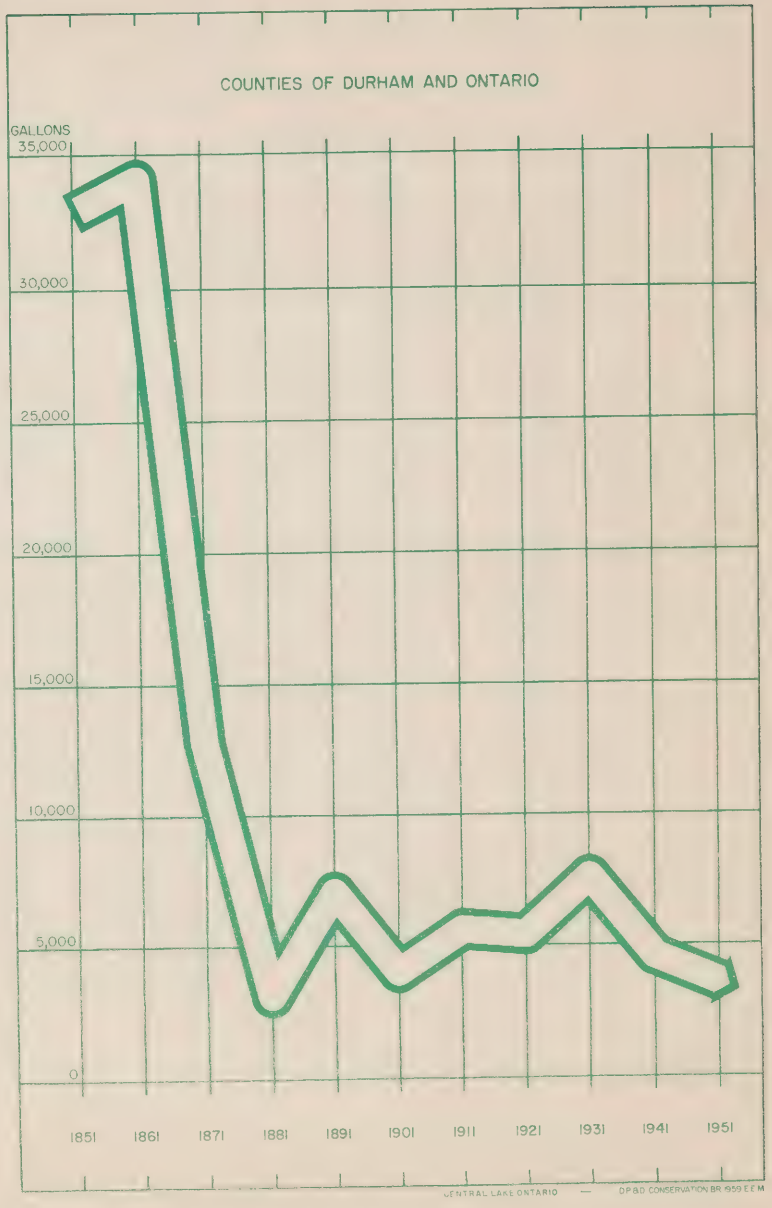
PER CENT WOODLAND



FUELWOOD PRODUCTION



MAPLE PRODUCTS
(EXPRESSED AS GALLONS OF SYRUP)



CHAPTER 2

SURVEY OF PRESENT WOODLAND

An accurate inventory of the existing woodland in the watershed and an estimate of its present condition is highly desirable in establishing a woodland conservation program. To obtain this information a study was made of all woodlands, scrublands, plantations and land suitable for reforestation.

The entire Central Lake Ontario area lies within the Huron-Ontario Section of the Great Lakes-St. Lawrence Forest Region*. In this forest section, as a whole, the prevailing association of forest trees is dominated by sugar maple and beech and this association is described as the climax type† for the area. Occurring in this climax type are other associated species such as basswood, white elm, yellow birch, white ash, hemlock and white pine. After disturbances such as cutting or fire this climax type may be replaced for a time by poplar and white birch. On local or specialized sites such as river bottoms and swamps there occur other aggregations of trees which may bear no relation to the typical or climax forest of the area; for example, an association where white cedar is the dominant species. These distinctive local combinations of tree species are in response to very local climatic, soil, topographic and drainage features.

1. Survey Methods

Aerial photographs, each covering about 1,000 acres, were provided to the forestry party, and mapping in the field was done directly on the photographs. Each area of woodland, scrubland, swamp and rough land was visited and described as to acreage, cover type, presence of grazing,

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* W.E.D. Halliday. A Forest Classification for Canada, 1937.

† The climax type is the one best suited to maintain itself permanently under the climatic conditions of a given area. Unless disturbed by fire, axe, or other agents it will eventually take possession and hold most of the area against the competition of other trees.

reproduction, and average diameter of trees at breast height.

Each woodlot was classified as hardwood, coniferous or mixed. The term "hardwood" is used to denote all broad-leaved trees regardless of their physical hardness. A woodlot in which 80 per cent or more of the trees are hardwoods is called a hardwood stand; one in which 80 per cent or more of the trees are conifers is called a coniferous stand; and all other stands are classed as mixedwood.

Plantations were likewise examined and records made of method of planting, approximate age, care, damage and survival.

Land suitable for reforestation was mapped, and descriptions were prepared in some detail for the larger areas.

2. Forest Cover Types

The term "forest cover types" refers to those combinations of tree species now occupying the ground, with no implication as to whether these types are temporary or permanent. A slightly modified form of the system drawn up by the Society of American Foresters has been used on this survey so that the system will adequately describe the cover types common to the watershed. The gaps in the numerical system are due to certain cover types common to the eastern United States which do not enter Canada.

The following cover types were encountered in the Central Lake Ontario area;

Type Number	Name
4	Aspen
4a	Poplar-oak
6	Paper birch
8	White pine-red oak-white (ash)
9	White pine
10	White pine-hemlock

11	Hemlock
12	Sugar maple-beech-yellow (birch)
13	Sugar maple-basswood
14	Sugar maple
14a	Black cherry
24	White cedar
26	Black ash-white elm-red maple
51	Red oak-basswood-white ash
52	Red oak
57	Beech-sugar maple
58	Beech
59	Ash-hickory
60	Silver maple-white elm
60a	White elm
88	Willow

Although twenty-one cover types were identified in the area, over 86 per cent of the woodland is contained within five cover types. In order of the area which they occupy, these types are as follows;

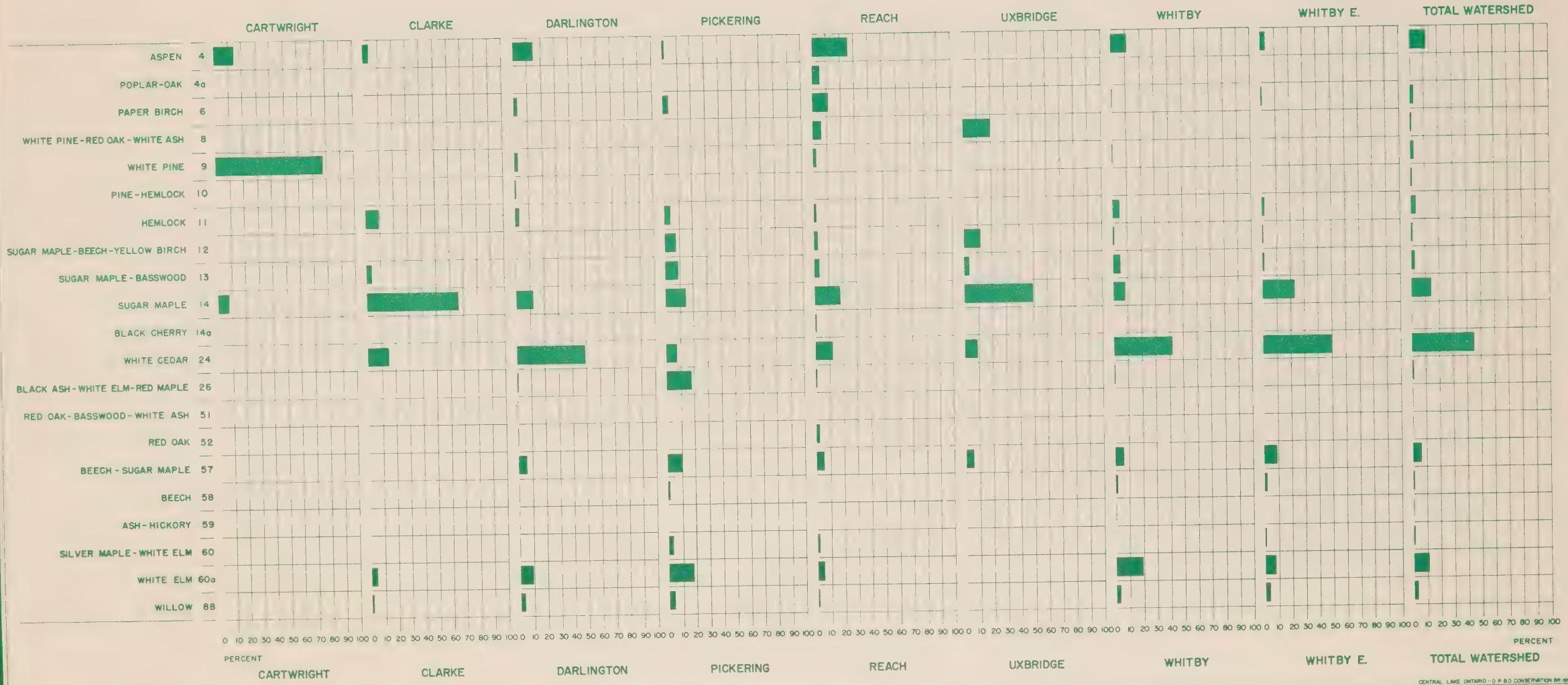
Type 24 White cedar, which covers 44.5 per cent of the woodland acreage. It occupies the valley bottoms and slopes which were too steep to clear for agriculture, and has again taken over wet pastures which have been abandoned for some time. It occurs in pure stands or in mixture with black ash, white elm, soft maple and white birch.

Type 14 Sugar maple, which occupies 13.4 per cent of the woodland acreage. This type and the closely related Type 57 originally covered most of the upland or better drained areas of the watershed but, since it occupied land which was considered fertile and with good moisture conditions, much of it was cleared to make way for agriculture. Calcareous soils are considered desirable for the vigorous

FOREST COVER TYPES BY TOWNSHIPS

PERCENTAGE BY TOWNSHIP

1959



CENTRAL LAKE ONTARIO - D.P.B.D. CONSERVATION BR. 1959 C.B.V.

growth of high-quality hard maple timber, and the upland soils of the area seem to satisfy this requirement well. Common associates of the type are white elm, white ash, basswood, black cherry and hemlock, with butternut and yellow birch typically occurring in the lowland locations of this type.

Type 4 Aspen, which comprises 11.5 per cent of the total woodland. Aspen is a pioneer type coming in after clearcut operations, overgrazing or fire. It quite frequently is the invasion species on abandoned fields and pastures. Though it avoids the wettest swamps it does grow on soils that are wet throughout a good part of the year, and occurs as well on the droughty soils. Its associates may be large-toothed aspen, balsam poplar, red cherry, white elm and paper birch. An understory of dogwood or of spruce and balsam fir on the wet sites, or of tolerant hardwoods on the drier sites, is frequently present.

Type 60a White elm, which covers 11.1 per cent of the woodland area. It occupies river bottoms or other areas too wet to be cultivated without complete underdraining. Elm may be in pure stands or associated with small amounts of soft maple and white or black ash.

Type 57 Beech-sugar maple, which now occupies only 5.9 per cent of the remaining woodlands. This is regarded as the typical association forming the climax type for the uplands of the region. Its associates are hemlock, white elm, basswood, white ash and black cherry, with hornbeam an important subordinate. The type, like Type 14

(sugar maple), was formerly very extensive in the area but, because it occupied the best land, its area has been severely depleted.

The remaining sixteen types are present in amounts which vary from three per cent of the woodland within the watershed to trace amounts of a few acres. Briefly these cover types may be described as follows:

Type 4a Poplar - oak is probably a result of fire in a former oak - pine type.

Type 6 Paper birch, like aspen, is a pioneer type following cutting or fire.

Type 8 White Pine - red oak - white ash occurs on moist but well-drained soils, mostly along valley slopes.

Type 9 White pine, most common on light sandy soils.

Type 10 White pine - hemlock, favours moister, cooler sites, ravines and north slopes.

Type 11 Hemlock, similar to above type, but with hemlock predominant over any single associate.

Type 12 Sugar maple - beech - yellow birch is a cover type associated with more northerly climates and consequently it has only limited distribution in this area.

Type 13 Sugar maple - basswood is another cover type in which hard maple is an important component of the stand. This type is important due to the demand for basswood logs.

Type 14a Black cherry, occurs in small patches on fertile well-drained soils; a temporary type following clear-cutting.

Type 26 Black ash - white elm - red maple, occupies wet muck soils in areas of slow drainage.

Type 51 Red oak - basswood - white ash grows on somewhat moister sites than the other oak types.

FOREST COVER TYPES

Township	Area	4	4a	6	8	9	10	11	12	13	14	14a	24	26	51	52	57	58	59	60	60a	88
Cartwright	42	6				33					3											
Clarke	151	5						12		5	99		22								6	
Darlington	8,628	1,195		212		180	38	237		10	1,024		4,156	23	6	1	459	11	2	41	186	247
Pickering	341	4		12				12	27	30	49		24	60			34	4		12	60	13
Reach	370	95	19	41	22	7		6	8	11	68	3	46	2		6	17			3	14	2
Uxbridge	110				22				14	4	54		10				6					
Whitby	3,208	331		17		9		154	16	149	243		1,361	10			186	22	3		620	87
Whitby E	1,977	66		8				30	6	23	448		977		1		171	26		12	157	52
Total	14,827	1,702	19	290	44	229	38	451	71	232	1,988	3	6,596	95	7	7	873	63	5	68	1,643	403
Per Cent	100	11.5	0.1	2.0	0.3	1.6	0.3	3.0	0.5	1.6	13.4	0.0	44.5	0.6	0.0	0.0	5.9	0.4	0.0	0.5	11.1	2.7

Type 52 Red oak occurs as small patches in the hills of the moraine.

Type 58 Beech, as a pure type, may have resulted from removal of maple from the beech - sugar maple type.

Type 59 Ash - hickory is a residual type which often occurs after logging and grazing of Type 60 stands.

Type 60 White elm - silver maple, occurs in river bottoms and on swampy depressions in rolling plains.

Type 88 Willow, occurs on wet sites along stream banks.

SUMMARY OF COVER TYPES

(a) Except for the very dry hills and the poorly drained depressions, the upland areas of the Central Lake Ontario Watersheds are generally characterized by sugar maple and beech - sugar maple stands which are the common climax type for the Great Lakes-St. Lawrence Forest Region. These types make up 19.3 per cent of the total woodland of the Watersheds. The hard maple types once extended over most of the upland areas, but such a large proportion of this land was highly desirable for agriculture that a relatively small remnant of these types remains.

(b) The swampy areas and ravines, which held but a small proportion of the original forest, have remained relatively undisturbed. As a result cedar and elm stands now make up 55.6 per cent of the remaining woodland.

(c) Aspen, which is a temporary type of low commercial value, now occupies 11.5 per cent of the woodland due to clear-cutting or other opening up of the forest. Much of this area could be occupied by more valuable forest species.

3. Condition of Woodlands

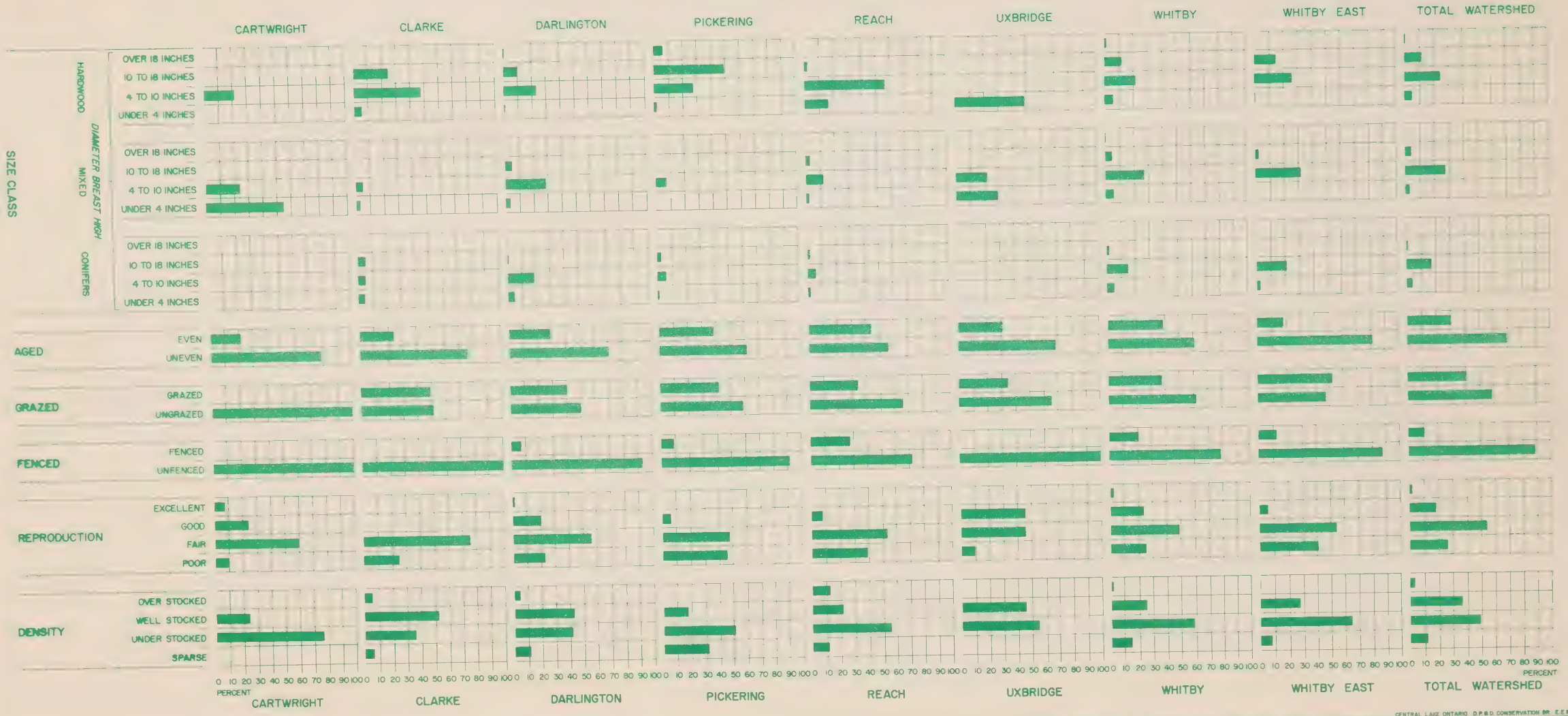
Conditions revealed by the survey are shown in some detail on the accompanying graph.

Natural woodland within these watersheds comprises 14,827 acres, which is 9.6 per cent of the total area

WOODLAND CONDITIONS BY TOWNSHIPS

PERCENTAGE BY TOWNSHIP

1959



CENTRAL LAKE ONTARIO D.P.&D. CONSERVATION BR. E.E.M. 1959

of 154,880 acres. This woodland is concentrated mainly in two east-west bands across the region; one, the rough hills of the moraine forming the north boundary of the watersheds; and the other, the poorly drained sand plain north of Whitby, Oshawa and Bowmanville. Between these two bands, woodland is sparse because the rolling till plain is highly developed for agriculture. South of the sand plain the area reaching to Lake Ontario was cleared for agriculture, and the little remaining woodland is now being further reduced by the spread of urbanization.

Of the total woodland, 42.1 per cent is classed as hardwood stands, 35.2 per cent as mixedwood and 22.7 per cent as coniferous. The low percentage of coniferous stands indicates that much of the cedar type has a considerable admixture of swamp hardwoods. Upland conifers and mixedwood types are scarce, and the supply of softwood sawlogs from natural stands in the area is extremely small.

Very little of the present woodland is mature and merchantable. Less than one per cent of the woodland is classed as over 18 inches diameter breast height. Coniferous stands between 10 and 18 inches, the size desired for posts and poles, make up another 1.0 per cent. The 12.5 per cent of young stands, under 4 inches diameter breast height, and 24.6 per cent of hardwoods between 4 and 10 inches will require some time to grow to merchantable size. Where the stands are over-stocked, this time may be shortened by thinning; but over half of the woodland is already slightly to severely understocked. The remaining hardwoods between 10 and 18 inches (11.8 per cent), mixedwood from 4 to 18 inches (31.9 per cent) and conifers 4 to 10 inches (17.3 per cent) will soon reach maturity and should pay for proper management in a relatively short time.

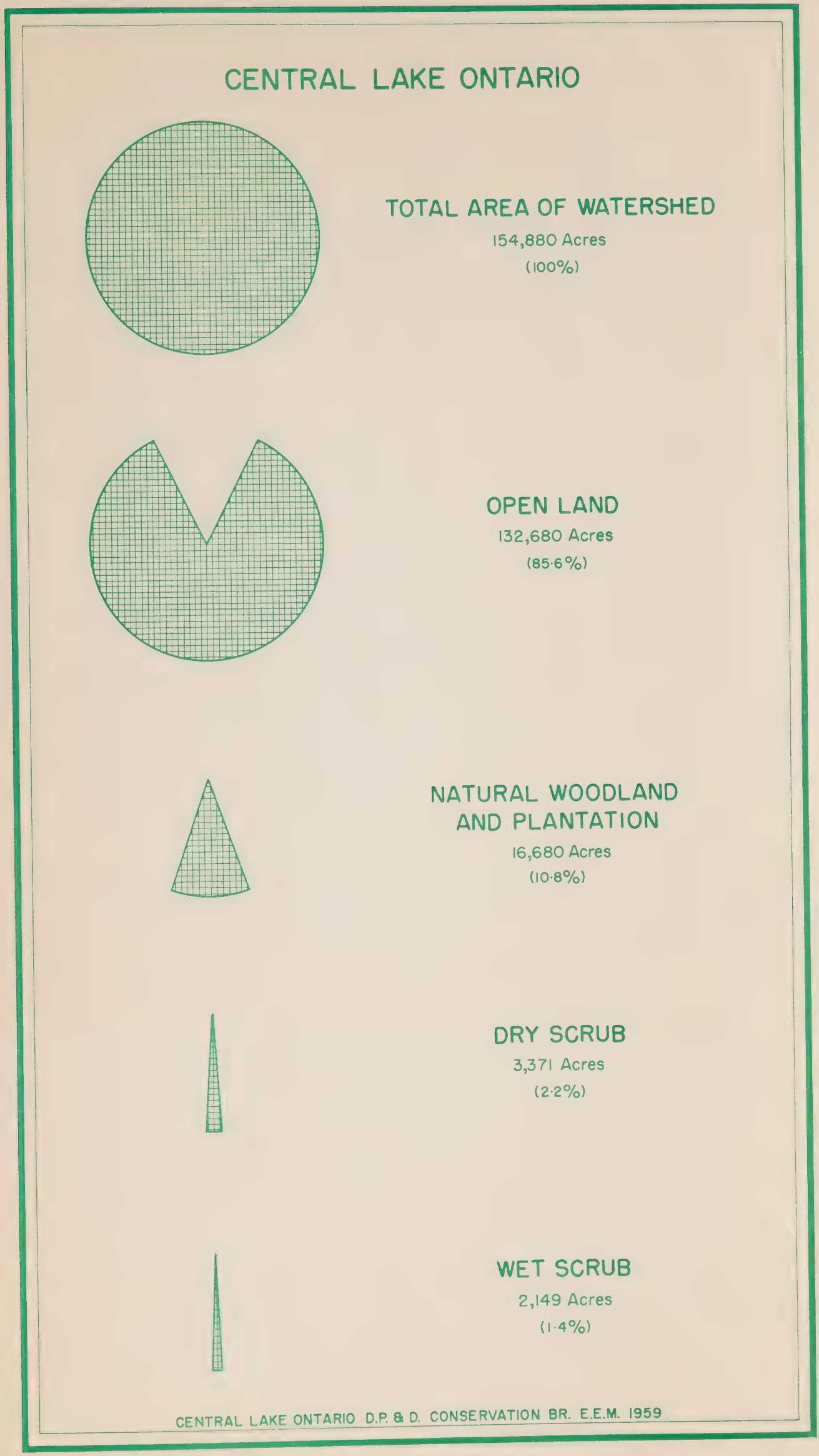
The survey indicates that 69.6 per cent of the woodland is uneven-aged and therefore might readily become a

source of continuous revenue to the owner, with some trees being cut every few years as they mature. However, this continuous production will not last for long unless there is an improvement in natural regeneration in the woodlots. Over 80 per cent of the woodland area shows regeneration only fair to poor. One obvious reason for this condition is the fact that nearly half the woodlots are grazed.

4. Scrublands

In all 5,520 acres in the Authority area are covered with woody species which never attain commercial size. The most common species are scrub willow and dogwood on poorly drained sites and hawthorn and sumach on dry sites. Much of this area is located on abandoned farmland or neglected pasture.

In some cases this land can be restored to agricultural use through drainage or through eradication of dry scrub. However, where such restoration does not seem economically feasible, the area should be returned to tree cover through systematic replacement of the scrub species with more valuable species.



LAND CLASSIFICATION — TOTAL WATERSHED

CHAPTER 3

FOREST CONSERVATION MEASURES IN PROGRESS

As would be expected from the nature of the terrain and the rapid urbanization in the southern part of the region, forest conservation measures have been concentrated in the north and eastern sections.

1. Private Planting

An unusual amount of private tree planting has been done in the Central Lake Ontario region. The total area of private plantation (1,690 acres) already equals over 10 per cent of the natural wooded area. This planting began over fifty years ago, but for the first twenty-five years progress was very slow. Only 42 acres of the present plantation had been planted by 1934. During the latter part of the depression planting increased and the rate was fairly well maintained even through the war years. However, it is the past ten years which account for over three-quarters of all the planted area.

Two-thirds of the planting during the past five years has been for Christmas tree production, and probably one-half the planting in the previous five-year period. Some of the larger operators, in particular, give their plantations excellent care including yearly pruning. However, there are other plantations whose owners have expected their trees to grow without any care and who will find their ground cluttered with unmerchantable trees. In general this industry makes good use of land too poor for agriculture. Unfortunately, on some properties only the best fields have been used and the rough hillsides most in need of trees have been left bare.

The older plantations show similar variations in care. Some have been pruned and a few thinned. Many, however, are slowed down in growth and badly in need of thinning. Timber production from these plantations will become impor tant, since they will produce the softwood lumber lacking in

White pine plantation established in 1905 by Francis Squair, a pioneer in forest conservation.

Darlington Township demonstration plot on Toll Gate Hill. An exceptional planting of red oak outgrowing Scotch pine at Twenty-seven years of age.

the natural woodlands. Many owners appear to have started their plantations more for other reasons, such as shelter-belts, aesthetic values, control of wind erosion or gully erosion and protection of streams. Whatever their purpose, plantations will do better if given the proper care.

2. Provincial Forest Station

Following the establishment of the first provincial tree nursery at St. Williams, the demand for planting stock increased so rapidly that additional nurseries were required. In 1922 the nursery at Orono was established and its area has since been expanded to about 1,000 acres, the western part of which is within the Authority boundary. This nursery now produces about 7 million trees annually for use in private and public reforestation projects.

3. Municipal Forests.

The Township of Darlington has used two areas to demonstrate to private owners the possibilities of reforestation. The larger tract is just outside the north-east corner of the Authority territory. The other is a five-acre plantation, thirty-seven years old, on Toll Gate Hill north of Bowmanville. The Scotch Pine in this plantation have been pruned and thinned and the red oak are doing very well. A sign to direct public attention to these results would add considerably to the demonstration value.

4. Tree-Cutting By-Laws

Under The Trees Conservation Act of 1946 and its successor The Trees Act (R.S.O.) 1950, c. 399) twenty-three counties have passed by-laws to restrict and regulate the cutting of trees. These by-laws do not interfere with the right of the owner to cut material for his own domestic use, but

specify certain diameters below which trees may not be cut for sale. The Durham County by-law forbids the cutting for sale of most species under ten inches diameter at breast height and a few species such as cedar under five inches. Unfortunately, this county had one by-law for the Ganaraska Authority area and another for the rest of the county "except the area of any watershed for which an Authority is, or may be established". The Central Lake Ontario area is therefore removed from these provisions for the County of Durham, and since the remainder of the Authority is in Ontario County which has no tree-cutting by-law, the Authority area is without any protection of this kind.

Such diameter limits are only an elementary step to prevent indiscriminate slashing of woodlands, but where these by-laws have been enforced rigidly they have proved of considerable benefit. There will, however, usually be fast-growing trees above the diameter limit which are increasing rapidly in value, and should be left for future cutting. There will also be poorly formed or diseased trees below the diameter limit which should be removed.

Better than a rigid diameter limit is the marking of trees for cutting according to their condition. Professional advice on such marking is available through the Zone Forester. Many tree-cutting by-laws, including that of Durham County, provide for the necessary variations from a strict diameter limit where the cutting is done under such supervision and in accordance with good forestry practice.

It is recommended that the Authority promote the adoption of a tree-cutting by-law for Ontario County and the revision of the Durham County by-laws to give uniform protection throughout the county.

5. Tree Farms

In the past few years a movement has been under way to recognize well-managed forest properties as Certified Tree Farms. With the sponsorship of several organizations

interested in better forestry, the Canadian Forestry Association in 1953 formed a National Tree Farm Committee to recognize with a suitable sign and certificate those owners who agree to maintain their land for growing forest crops, protect the land adequately, agree that cutting practices will be satisfactory to ensure future forest crops, and permit inspection by Committee foresters.

On Lot 5, Concession V, Darlington, Mr. Leslie Coombes operates his 33-acre woodlot on a conservative basis, cutting in keeping with good forestry practice.

Several Conservation Authorities have become co-sponsors of the Tree Farm movement in their areas. It is recommended that the Central Lake Ontario Conservation Authority give similar support to this movement.

6. Forest Conservation Measures in Other Areas

(a) County Forests

The first county forest in Ontario was established in 1922. Most county forests are managed by the Ontario Government under agreements similar in most respects to those described for Authority forests in the following chapter. Both Durham and Ontario Counties have well developed forests but none of their properties are within the Authority area.

(b) 4-H Clubs

These clubs are organized by the Ontario Department of Agriculture assisted by the Department of Lands and Forests and must be sponsored by an organization interested in the improvement of woodland and reforestation.

Members must be between 12 and 21 years of age and each member undertakes a project such as marking a half-acre plot of woodland for thinning or reforesting a quarter-acre of land. Projects are judged annually on Achievement Day and prizes awarded. For this purpose the Department of Agriculture furnishes $3.00 per member and the sponsoring organization $1.50. Winners may enter the provincial Inter-Forestry-Club Competition.

Sponsorship of these clubs in the schools of the Central Lake Ontario region would be a worthwhile project for the Authority.

CHAPTER 4

FOREST CONSERVATION MEASURES REQUIRED

The future of forestry will vary greatly in different parts of the watershed. In the immediate vicinity of Whitby, Oshawa and Bowmanville woodlots will disappear before advancing subdivisions. In these sections it is only along the valleys that any substantial area of woodland will remain and, since its main importance will be recreational, the preservation of this type of forest will be left to other sections of the report.

In the north and east there are still sections where the nature of the land and its location make the retention of forest cover on large tracts quite practical both for wood production and for the protection of the headwaters of many streams.

The central farming areas present a different problem. Here we must consider the higher agricultural potential of the land, the pressure of urban workers seeking country home sites, and the conversion of many farms into country estates where farming is continued but is no longer the primary source of income. Large forests cannot be expected, but woodlots on the poorer parts of farms will be retained for their aesthetic value if not primarily for timber production. Whatever the owner's point of view, it is better to retain a good woodlot than a poor one.

The activities through which the Authority may promote forest conservation fall into three broad categories. In larger areas needing reforestation or management the Authority may acquire land and manage it directly. In private planting and woodlot improvement demonstrations the Authority may cooperate with private landowners. Through public meetings, field days and publications, the Authority may educate and encourage residents of the Central Lake Ontario area to practise conservation on their own lands.

1. Central Lake Ontario Authority Forest

When large areas (100 acres or more) require reforestation or woodland management, the task is frequently too great for private initiative. In some cases acquisition by the Authority is recommended. This is particularly desirable where these forests form natural water-storage areas which decrease the severity of floods and maintain the summer flow of streams. Other tracts which at present lie idle or produce only sparse, droughty pasture can again be made to add to the economy of the area through reforestation.

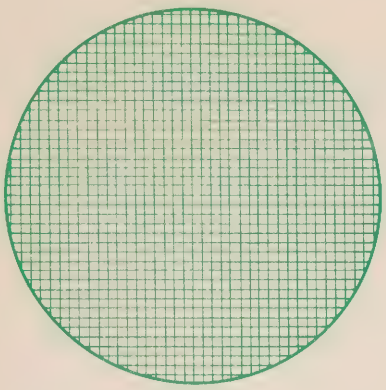
Fourteen Conservation Authorities have now entered into agreements with the Ontario Government for the establishment and management of Authority Forests. The Province advances half the cost of the land, and in some cases, where it is necessary or desirable to include merchantable timber, the Province also assumes the cost of the merchantable timber. These agreements run for a period of 50 years, during which time the Ontario Government agrees to establish the forest and pay the cost of such items as fencing, buildings, equipment, labour, maintenance, trees, etc., - in short, everything connected with the management of the forest.

At the end of the 50-year period the Authority may exercise any one of three options; first, to take the forest over from the Government and pay back the cost of establishment and maintenance without interest; second, to relinquish all claim to the forest, whereupon the Government will pay to the Authority the balance of the land cost without interest; third, the forest may be carried on as a joint undertaking by the Province and the Authority, each sharing half of the cost and half of the profits. Authority lands are subject to municipal taxes. A number of areas suitable for this purpose have been defined, mainly at the headwaters of the streams within the Authority area. The nature and distribution of these areas by townships are shown in the table below.

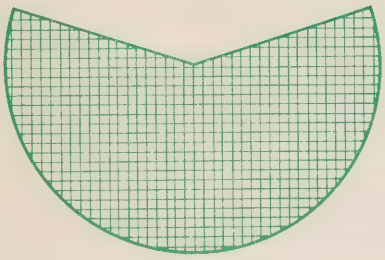
In all 11,284 acres are recommended for acquisition by the Central Lake Ontario Conservation Authority. Of this total, 6,780 acres are open lands, 2,891 acres have some form of natural tree cover 943 acres have already been planted and 670 acres are scrubland and marsh. A minimum of land in the better classes has been recommended for reforestation. However, it was impossible to omit such land entirely when it formed a small part of a lot which was composed mainly of a poorer type of soil. In the few cases where these lands are already being well managed by private owners, there is no urgency for public acquisition. Even here, however, the Authority must be alert to see that a change in circumstances does not allow these lands to fall into other hands in which their usefulness for conservation purposes might be destroyed. It is for this reason that these few properties are included in the recommended areas.

The problem of land acquisition should be approached carefully. In most cases purchase will be arranged by direct negotiation. The Authority should also be alert to acquire tax-delinquent lands. The Authority has the power to expropriate land and is justified in doing so when an unreasonable attitude on the part of the owner stands in the way of works urgently required for the general good. However, a favourable public attitude is essential to the furtherance of conservation, and such powers must be used with discretion. Very few of the recommended properties are occupied. In an exceptional case, if a hardship would be entailed by asking an old resident to move, some special provision such as a life tenancy of the house might be arranged.

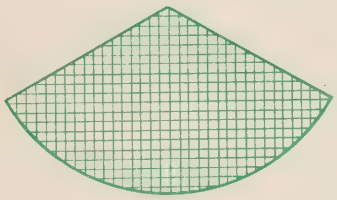
CENTRAL LAKE ONTARIO



TOTAL AREA
OF
RECOMMENDED AUTHORITY FOREST
11,284 Acres
(100%)



OPEN LAND
6,780 Acres
(60·1 %)



WOODLAND AND PLANTATION
3,834 Acres
(33·9 %)

SCRUBLAND
666 Acres
(5·9%)

MARSH
4 Acres
(0·3%)

CENTRAL LAKE ONTARIO D.P. & D. CONSERVATION BR. E.E.M. 1959

LAND CLASSIFICATION
RECOMMENDED AUTHORITY FOREST

RECOMMENDED AUTHORITY FOREST - ACRES

Township	Open	Woodland & Plantation	Scrub	Marsh	Total
Cartwright	397	362			759
Clarke	398	165	27		590
Darlington	4,129	2,776	520	4	7,429
Reach	654	254	44		952
Whitby	37	42	26		105
Whitby E	1,165	235	49		1,449
Total	6,780	3,834	666	4	11,284
Percentage	60.1	33.9	5.9	0	100

2. Private Reforestation

On many farms, even in the better farming areas, there are small tracts which, because of steep slopes, stoniness or poor drainage, would be better in tree cover. These tracts are not suitable for public acquisition and management, but the effect of reforestation on control of run-off, improved summer stream flow and stabilization of wood-using industry justifies public assistance in such work. These areas have not been privately reforested heretofore because the owner has some other minor use for the area, because he is discouraged by the long period between planting and harvest of a forest crop or more commonly simply because of inertia on his part.

The interest of private owners in reforestation may be fostered in several ways. Public education, such as that now carried out by the Zone Forester in the district, can be furthered by the Authority. In addition, direct assistance to private planting can be given.

Several other Conservation Authorities have purchased tree-planters which supply a planting service to private owners at a nominal cost. Where rough ground makes hand planting necessary, some Authorities refund $10 per acre if inspection

shows that planting has been done carefully and the plantation is adequately protected from livestock. When labour conditions permit, the Authority might itself organize crews for hand planting on these sites.

It is the policy of the Department of Lands and Forests to charge $14 per thousand for Scotch pine and $10 per thousand for other planting stock. For some years trees were distributed free. Following the end of the war in 1945, the nurseries were unable to meet the greatly increased demand, and it was felt that a charge for trees would ensure more care in ordering the required amount and in planting the trees received.

The assistance schemes carried out by other Authorities have stimulated interest in private reforestation while still ensuring the good use of the planting stock. It is recommended that the Central Lake Ontario Conservation Authority adopt some similar policy of assistance to private reforestation.

3. Woodlot Improvement Projects

For most persons the best lesson in conservation is field observation of specific examples of the present abuses and efforts to remedy them. Woodlots chosen as illustrations must be near good roads and should be marked with large signs giving considerable detail of conditions and improvement measures in progress. Roadside or other parking facilities would have to be provided so that visitors could take the full time necessary for inspection without interfering with other traffic.

Some of the proposed improvements are experimental in nature. From the owner's point of view the whole program may seem to be of unproved value. On these sample areas the Conservation Authority is therefore fully justified in assuming part of the actual woodlot improvement cost as well as the cost of signs and parking facilities.

To use a private woodlot in this way for educational purposes would require a definite agreement with the owner to ensure that the proposed improvements were carried out, and that the benefits of this work would not be lost by a change of ownership or of attitude on the owner's part. In addition a detailed record of costs and returns would be necessary to show other owners that it would pay for them to adopt similar practices in their own woodlots.

Some owners may be willing to see their woodlots used for such demonstrations, but wish to be relieved of any personal participation in the project. In such cases the Authority might lease the woodlot or purchase it outright.

Below are listed several examples of well-located woodlots suitable for Authority woodlot improvement projects. The Conservation Authority should decide on suitable forms of agreement, leases, etc., explain the purpose of these projects to the owners and try to enlist them as co-operators. This list is by no means exhaustive, but serves to illustrate the type of woodlot suitable for such projects.

(1) Lot 6, Concession II, Reach
4 Miles north-west of Myrtle

This sugar maple - basswood stand contains a variety of species, including a few white pine, but regeneration is lacking and the stand is sparse in some sections and too dense in others. It needs fencing to prevent grazing and scarification of grassy spots to encourage regeneration. The dense clumps need thinning, favouring the better trees and removing non-commercial species.

(2) Lot 35, Concession IX, Whitby
½ mile north of Dagmar Station

This young hard maple stand has good reproduction. A few old maple and beech should be removed and the stand thinned to remove poor specimens and encourage rapid growth. The woodlot should be fenced.

(3) Lot 21, Concession VII, Whitby
2 miles north of Brooklin

A beech - hard maple type, approaching maturity; it contains a variety of species and age classes and excellent reproduction. A few mature and overmature trees should be removed now. This is a good example of an uneven-aged stand which could be managed by selection cutting of some trees every few years as they mature, and any necessary thinning of the younger trees done at the same time.

(4) Lot 11, Concession VII, Whitby E.
½ mile east of Columbus

This hard maple stand approaching maturity is sparse and lacks reproduction because of grazing. It should be fenced, the ground scarified in open spots to encourage regeneration, and the dense underbrush sprayed to reduce the competition which prevents tree seedlings from becoming established. Once reproduction is established some of the old trees can be removed.

(5) Lot 10, Concession IV, Darlington
3 miles east of Hampton

This is a young beech - sugar maple stand, below normal but irregular in density and reproduction due to grazing. The woodlot should be fenced and a few poor-quality mature and younger trees should be removed.

4. Forest Research

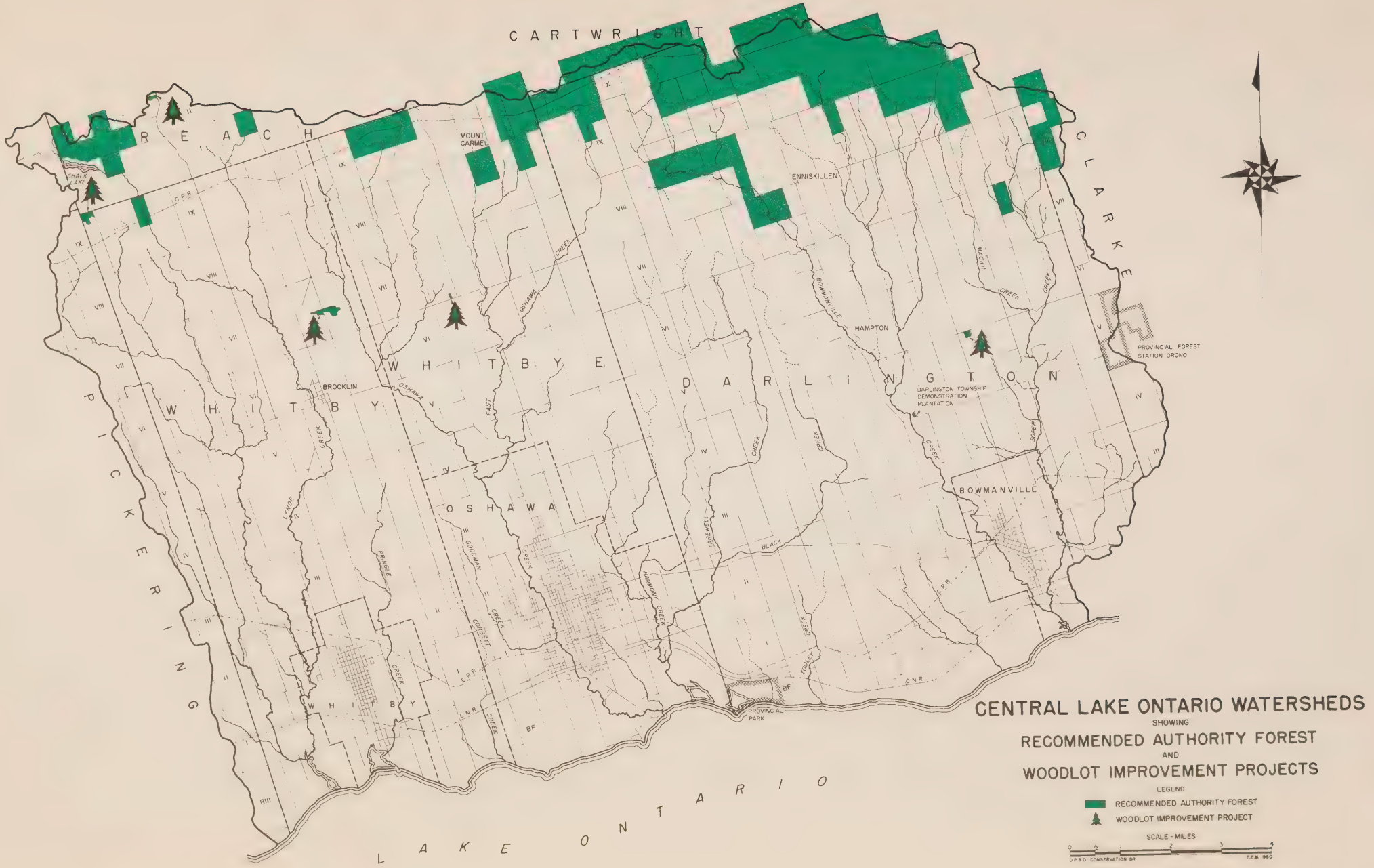
Detailed scientific research is the task of universities or government departments with greater research facilities than are available to a Conservation Authority. Large-scale application of proven methods is the task of private owners or of the Department of Lands and Forests in managing Authority Forests. Between these two extremes, however, there are many possibilities for small-scale investigations which are urgently needed and which the Authority might encourage on its own land or on private land under agreement. Determination of the best planting methods on difficult sites such as valley slopes, comparison of growth in different plantation mixtures,

investigation of the value and cost of cultivation in plantations and the actual improvement in woodlots following thinnings or other treatment are all projects which would guide the people of the watershed in managing their own plantations and woodlots. The Authority should encourage such investigations and co-operate with the Department of Lands and Forests in carrying them out.

5. The Authority and Conservation Education

Many agencies at present do, or can, engage in conservation education. The Authority can supply opportunities and materials to encourage and enlarge these activities. Wall maps, literature, conservation pictures and conservation lectures supplied to the schools will help to give geography, history and conservation practices a local significance. Building up a library of slides on local conservation problems and accomplishments would be of great assistance to speakers. Organization of public meetings and contact with individuals and groups such as farm forums will gain support for both private and public conservation efforts. Landowners should be encouraged to make greater use of the services available from the Conservation Authority and from officers of the Department of Lands and Forests and the Department of Agriculture.

The most effective educational activity is actual participation in or field observation of conservation projects. Tree planting days, group visits to woodlot improvement projects and conducted tours over a well organized conservation trail could all be sponsored by the Conservation Authority. These activities would all stimulate individual action on forest conservation measures, such as those described in the following chapter, which cannot be carried out directly by the Authority.



CENTRAL LAKE ONTARIO WATERSHEDS

SHOWING

RECOMMENDED AUTHORITY FOREST

AND

WOODLOT IMPROVEMENT PROJECTS

LEGEND

RECOMMENDED AUTHORITY FOREST

WOODLOT IMPROVEMENT PROJECT

SCALE - MILES

0 ½ 1 2 3 4

D.P.&D. CONSERVATION BR. E.E.M. 1960

CHAPTER 5

FURTHER CONSERVATION MEASURES REQUIRED

1. Woodland Management

The woodlot inventory shows that there are 14,827 acres of natural woodland in the Central Lake Ontario region. Practically all of this area requires better management. While experimentation is desirable to determine the best method of handling certain problems, the general principles of woodlot management have been known for years but have not been applied. A free advisory service is available from the Zone Foresters, but is not sufficiently used, and a readily-understood pamphlet on "The Farm Woodlot" can be obtained from the Department of Lands and Forests.

One of the most difficult problems confronting the private owner in the management of his woodland is the utilization of the small woodland products which can be readily made and handled by the owner. These products, such as fuelwood, pulpwood, bolts, posts and poles, if properly harvested, increase the productivity of the woodlot and the gross returns per acre. The volume of these small products thrown on the market would be reduced by diameter-limit regulations which restrict the wholesale commercial slashing of woodlots. Nevertheless, much material of this type could still be produced from thinnings and improvement cuttings and from limbs and tops of trees. The difficulty of marketing such low-grade material has seriously hampered owners in carrying out the needed improvement work in their woodlots. Any means which can be discovered for using small and poor-grade wood should be developed to the fullest extent. At the present time interest is increasing in the possibility of manufacturing wood chips in the woodlot by means of a portable chipper. Such chips can be used for the manufacture of pulp for paper, and as cattle bedding and chicken litter, which can subsequently be spread on fields to increase the humus content of the soil. They can be made from any species of wood, and tops and branches can be utilized. The number of pulp companies which can use

hardwoods is limited at the present time and only those making kraft paper can use chips containing bark, but the demand for hardwood chips will increase and portable barkers are being developed. Every woodlot owner should consider the possibility of improving the quality of his woodlot by utilizing the low-grade material as chips or otherwise.

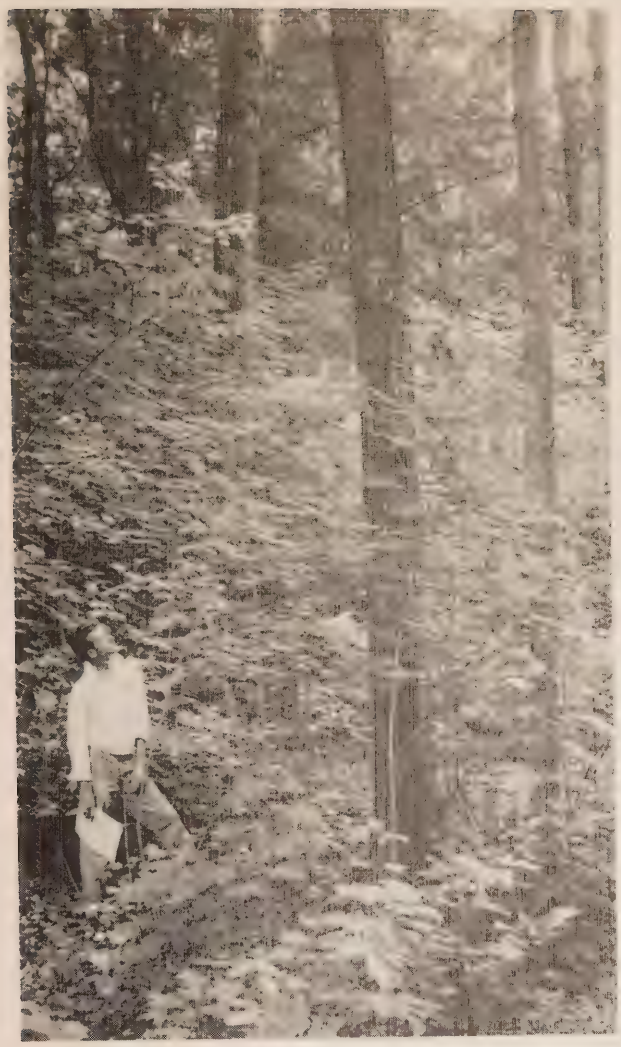
Owners of large woodlots might be encouraged to undertake thinnings and improvement cuttings if equipment or trained crews were available at reasonable cost. The Authority should consider offering such a service. As an alternative, the Authority might offer a subsidy for each acre improved to its specifications and found satisfactory on inspection by the Authority's officers.

2. Elimination of Woodland Grazing

The Report of the Ontario Royal Commission on Forestry, 1947, contains the following statement:

> "The most widespread abuse of forests is that of utilizing them as pasturage for animals. If this practice alone could be eliminated more than half the battle to save Ontario woodlots would be won. Forestry and pasturage cannot succeed on the same piece of ground as diametrically opposite conditions are necessary for each.
>
> It is foolish to consider replanting millions of acres to forests unless the owners of millions of acres already under forest are convinced of the necessity and economy of caring for them in such a manner that they will be perpetuated and improved".

This is not a new theme. As early as 1908 the Ontario Legislature, in providing an exemption of one acre in ten used for forestry purposes, included a "no grazing" clause. There are a number of reasons for the widespread practice of allowing woodland grazing. The woodlot has always been considered a pasture field even though the value of woodland pasture is low compared to cleared land. The reason for its low carrying capacity is partly because grass grown in the shade is not nearly as high in food value as that grown in full



Cedar and hemlock occupy swamps and valleys.

Hard maple once covered most of the better soils.

Bare ground in a grazed woodlot contrasts with abundant regeneration in the protected woods across the fence.

sunlight. The following statement in respect to woodland pasture has been made by leaders in agriculture: "On the whole the opinion of the Agronomists is that, on the average, woodland pasture will produce about one-sixth the quantity of pasturage, and the quality will be about one-half as good as that of the improved pasture". Weeds are usually prolific in wooded pastures, often smothering most of the grass.

If shade is required for stock, it may be desirable to leave a portion of the woodlot in the pasture when fencing the woodlot. Another solution is to establish small groves of fast-growing hardwoods which can be fenced temporarily until the trees are sufficiently tall that browsing will not damage crown growth. Where springs or streams that supply water for the stock are situated in the woodlot access may be made to a trough near the spring and the area should be fenced to prevent trampling.

The economic fallacy of grazing woodlands is illustrated by the following examples:

(a) *The Wisconsin Agriculture Experiment Station measured the total yield per acre of dry matter from three types of pasture over a five-year period in Richland County:

Improved pasture (grass and legume)	3,210 lbs.
Unimproved open pasture	1,453 lbs.
Woodland pasture	276 lbs.

Here the improvement of one acre of open pasture provided a gain of 1,757 pounds of feed, which is equivalent to the forage from 6.4 acres of woodland producing at the rate of 276 pounds per acre. In this case the improvement of about 6½ acres of existing open pasture would provide all the additional roughage that could be obtained from 40 acres of woodland.

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* The Case Against Cows. Wisconsin Conservation Bulletin, December 1951.

(b) * The U.S. Soil Conservation Service co-operating with the Wisconsin Agriculture Experiment Station conducted studies which showed that the daily pasture cost per cow was greater in woodland pastures. Taxes and other charges against the land, fencing, costs of establishment and acres required per cow were all considered. The study showed the relative daily pasture costs per cow on different classes of pasture to be approximately as follows.

Rotation pasture	5¢
Open permanent pasture	6¢
Improved pasture	5¢
Wooded pasture	17¢

At this rate, for a 180-day grazing season, woodland pasture cost $30.60 per cow, whereas on improved pasture the cost was $9.00. In other words, wooded pasture cost over three times as much as improved pasture.

(c) A fully timbered average maple stand, 60 years old, may yield about 4,000 board feet of saw timber per acre, net scale. Such a woodlot is virtually ruined by 20 years of heavy grazing, whereas 20 years of protection and no logging may increase the net volume to approximately 8,500 board feet per acre. The gain of 4,500 board feet is equivalent to an annual increase of 225 board feet per acre. At $28 per thousand on the stump this amounts to a mean annual gross income of $6.30 per acre over the period of utilizing only the increase in volume.

Livestock admitted to woodland browse on the leaves and shoots of small trees and ride them down, and by scuffing the surface roots of larger trees injure them and permit entry of fungus diseases.

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* Soil Conservation Service, U.S. Department of Agriculture. Forestry Handbook (Fourth Edition), 1948. Upper Mississippi Region. Compiled and Edited by S.S. Locke, Chief, Regional Forestry Division.

Field observations indicate that cattle have preference habits in grazing woodlands. Unfortunately this preference is for the more economically desirable species such as maple, basswood, elm and beech, whereas undesirable species such as hornbeam, blue beech, dogwood and hawthorn are grazed only when cattle are seriously underfed. This combination of factors, under continued grazing, changes not only the quantity but the quality of the reproduction and so the succeeding stand. The poorer hardwood species and conifers where these occur, are favoured. The invasion of pastures by cedar and hawthorn is an illustration of this grazing preference.

Continued overgrazing affects natural reproduction both directly and indirectly; directly in so far as it affects the reproduction itself and indirectly through its effect on the soil. Livestock trampling compacts the soil, breaks up the protective layer of litter, exposing the mineral soil to drying; and the cattle, by consuming the vegetation within reach, reduce the volume of litter naturally returned to the soil. It is this litter which keeps the soil open or porous and in a highly absorptive state. Thus water relations are changed, which adversely affects the rate of tree growth and may early eliminate seedlings which manage to make a start in the compacted soil.

A woodland is doomed where conditions persist which will not permit natural regeneration. After a time with no new growth to replace larger trees which die of natural causes, the canopy begins to open up, and sunlight let in further dries out the soil. Weeds and later grasses which require plenty of light gain a foothold and a sod begins to form. In general, tree seeds which germinate cannot compete with an established grass cover. As these effects of grazing progress the stand becomes open or park-like and eventually all the trees disappear.

Livestock grazing affects more than the growth of trees on the owner's land. Soil erosion in the woodland increases as the absorptive capacity and mechanical protection afforded the soil by the litter is reduced. The open canopy exposes the soil to the erosive force of rain impact and a compacted soil forces overland movement of water. Livestock tend to follow trails in the woodland and these often become centres of serious erosion. Thus continued grazing increases surface run-off and soil erosion. In a series of tests made by the Lake States Forest Experiment Station,* the compaction of the soil in grazed woodland and plantations was found to reduce the rate of infiltration of water into the soil by 93 per cent as compared to similar ungrazed areas.

Soil losses and amount of water which ran off the land were measured at the Soil Conservation Experiment Station, La Crosse, Wisconsin. The following table† shows the results of measurements of four heavy rains recorded during the 1935 growing season on three separate watersheds having the same soil type.

	Run-Off		Soil Loss
	Inches	% of Total Precipitation	(Lbs. per Acre)
Watershed A (Grazed Woods)	1.01	12.61	1,560
Watershed B (Protected Woods)	.02	.25	20
Watershed C (Open Pasture)	.34	4.24	560

Watershed A: 2.67 acres of second growth hardwoods.
Slope 15 - 18 per cent.
Grazed to optimum carrying capacity.

Watershed B: 11.5 acres of second growth hardwoods.
Slope 25 - 50 per cent
Neither grazed nor burned.

Watershed C: 5.85 acres cleared of second growth timber in 1932.
Slope 25 - 35 per cent.
Grazed to optimum carrying capacity.

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* Technical Note No. 556, April, 1959.

† Technical Bulletin No.973 U.S. Department of Agriculture. Soil Conservation Service. 1949.

Obviously continued woodland grazing is more than the private affair of the property owner. Anything which contributes to soil loss and to increased surface run-off lowers the yield capacity of the land on the one hand and adds to the flood hazard on the other. The lessened value of wood products reaching the market and the increased cost per cow on poor pasture are economic losses to the community as well as to the individual.

In spite of the studies and publicity to date, the seriousness of the grazing problem has not yet been brought home to the person most concerned, the farm woodlot owner. It is recommended as a step in this direction that the Authority publish a simple, attractive bulletin on woodlot grazing.

3. Forest Fire Protection

The average person does not realize the seriousness of damage caused by fire in the woodlot. Though he may know that young growth and small trees are burned by surface fires he does not realize the extent of the less obvious damage such as the destruction of humus which itself preserves the condition and water-retaining capacity of the soil. When the humus and ground cover are destroyed the sun and dry winds remove the moisture required for tree growth and plant nutrients are destroyed. The heat of the fire also injures the growing tissue inside the bark of older trees which are not actually burned, exposing the wood to attack by insects and fungi. Even though through time the wounds may be completely healed, the damage shows up as defects when the tree is cut for lumber.

The first step in fire control is fire prevention, and the best assurance of prevention is an enlightened public opinion which will make every member of the rural community conscious of the seriousness of the fire damage and of his duty as a citizen to do all he can to prevent it.

The farmer can prevent most fires in farm woodlots if he exercises the same care that he does around his home and buildings. It is particularly necessary to exercise such care in areas which have been cut recently, since the accumulation of slash creates a serious fire hazard. Close utilization of tops and the scattering of slash so that it lies close to the moist ground and rots faster will help to reduce this danger.

From the evidence collected in the northern states of the United States, where conditions most nearly approximate those of rural Southern Ontario, it is apparent that the most effective fire protective systems are those set up under the following conditions:

(a) Where the system is organized under the direction and control of the state forester and the wardens in each township are appointed by him on the recommendation of the local council.

(b) Where wardens paid an annual retainer are actual residents in the locality. Usually they are farmers who have had practical instruction in fighting fire. They have the power to call out other local residents to help in fire-fighting and maintain a store of fire-fighting tools on their premises.

(c) Where the warden is assisted in his work by all members of the community. That is, his address and telephone number are known to everyone and fires are reported to him immediately.

(d) Where designated members of the community know that they are likely to be called on to fight fire and are paid so much per hour for the time they are so employed.

(e) Where every resident is thoroughly fire-conscious and realizes that loss of timber by fire is a loss to the whole community, and considers it his duty to prevent, report and fight fire.

Steep hillsides are often neglected on Christmas tree farms.

A windbreak gives protection to the fields.

Ploughed fire-guards protect a plantation from roadside fires.

(f) Where fires for burning brush and rubbish may be set only after a permit has been obtained from the local firewarden.

Such a system might be adapted to the more heavily wooded areas in the north and eastern sections of the Central Lake Ontario region. It is therefore recommended that the Authority set up a committee to determine the best method of providing fire protection for public and private lands, through the co-operation of the Department of Lands and Forests, for the protection of woodlands in those sections of the Authority area.

4. Protection from Insects and Diseases

In projects such as the public and private reforestation recommended for the Central Lake Ontario region, careful consideration should be given to the prevention of outbreaks of insects or tree diseases and adequate arrangements made for the immediate application of control measures when these become necessary. While it is not possible to predict accurately the course insects or disease may take under the ever-changing conditions of a newly forested area, there are a number of fundamental principles which, if applied, will greatly lessen their destructiveness.

Large areas of one kind of tree present ideal conditions for an outbreak of insects or fungus disease. Mixing species in the plantation or separating the species in small blocks tends to slow the spread of outbreaks until natural agencies bring them under control or direct control measures can be applied.

It is important to plant only the species of trees suitable to the site and existing growing conditions. Healthy, vigorous trees are certainly more resistant to attack than weak, struggling ones.

Over-mature and dead trees should be removed from the existing stands as these harbour bark-beetles and

wood-boring insects which may become excessively abundant and attack healthy adjacent trees. Fungus infections may likewise spread from such sources.

Care should be exercised to prevent ground fires. Even light ground fires are frequently followed by severe outbreaks of bark-beetles and wood-boring insects and fungus infection at the base of the trees.

It is essential that an inspection be made each year so that any abnormal increase in insects or disease may be noted and control measures initiated before the outbreak becomes serious. Prompt action may reduce control measures to a comparatively easy task and confine damage to a small area.

(a) Some Important Insect Pests

The White Pine Weevil has caused serious damage to plantations by attacking the leading shoots of young white pine. As this insect prefers to work in full sunshine, white pine should be grown in a mixture with some other species which will shade the pine in its early years.

In recent years the European Pine Shoot Moth has increased to epidemic proportions in red and Scotch pines. Investigations are under way but no simple and effective control measures have yet been discovered. Another enemy of these species, the Root-collar Weevil, has recently caused serious damage in some plantations. This insect kills young trees by girdling them below the ground. Certain insecticides applied around the base of infested trees are said to give good control.

Leaf-feeding insects may kill conifers by one complete defoliation and hardwoods by defoliation for three years in succession. However, even partial defoliation may so weaken trees that they will be attacked by other enemies. Protection from leaf-feeding insects is therefore desirable. This is the kind of attack against which spraying is most successful.

Since investigations of forest insects are constantly under way, the owner considering insect control should

always check with the Zone Forester to find the most effective methods now in use.

(b) Tree Diseases

The chief diseases of the hardwoods are the various trunk, butt and root rots, and chronic stem cankers, which are all endemic and may cause serious damage under aggravating conditions. Woodlots in the Central Lake Ontario area present very diverse conditions with respect to the incidence of these diseases, a circumstance which is usually related to their past history. Thus many containing old timber are in need of heavy preliminary salvage and sanitation cuttings as a result of mismanagement or neglect. Such cuttings should precede or be combined with cleanings and improvement cuttings designed to improve the composition and structure of the stands. Having established a sanitary condition, normal care should maintain it and obviate loss on account of decay.

The wood rots are commonly thought of as diseases of mature and over-mature timber, but experience has shown that infection may occur at a very early age. In hardwood sprouts the stem may be infected from the parent stump. In older trees infection is chiefly through wounds, either of the root or trunk, which may be caused by fire, trampling by animals, insects meteorological agencies, or by carelessness or accident in felling and other woods operations.

For many reasons "cleanings" in the reproduction are desirable, especially where the woods have been heavily cut. Besides favouring the valuable species, those stems which are of seedling origin should be favoured over stump sprouts which are more liable to decay.

In harvest cuttings, which should recur at frequent intervals, the permissible volume allotted should include trees in which incipient decay is discovered and so far as possible those which have become a poor risk through injury or other circumstances.

The white pine blister rust is a serious enemy of that important species. It can be controlled by elimination of the currant and gooseberry bushes which spread the disease. This is economically feasible where white pine is growing on good sites, and where a considerable concentration of white pine on a small area reduces the labour involved.

The Dutch elm disease, which causes rapid wilting and death to all native elm trees and most introduced species has caused great concern ever since the first discovery in Canada in 1944. While no actual survey for this disease has been made in the Authority area, trees at Ajax on its western boundary are heavily infected and the disease may be expected to occur generally throughout the region. Control is achieved by elimination of diseased trees and by spraying healthy trees to prevent attack by the elm bark beetles which carry the disease. For valuable trees in parks, along streets or around houses the cost of control is well within reason. The Authority should alert its member municipalities to the danger and cooperate with them in making plans to control this disease.

5. Windbreaks and Shelterbelts

In the process of clearing land for agriculture, woodlots and belts of trees along fence lines have been removed which had served as natural shelterbelts. The restoration of these in the form of windbreaks is essential to a complete conservation program in many parts of Southern Ontario.

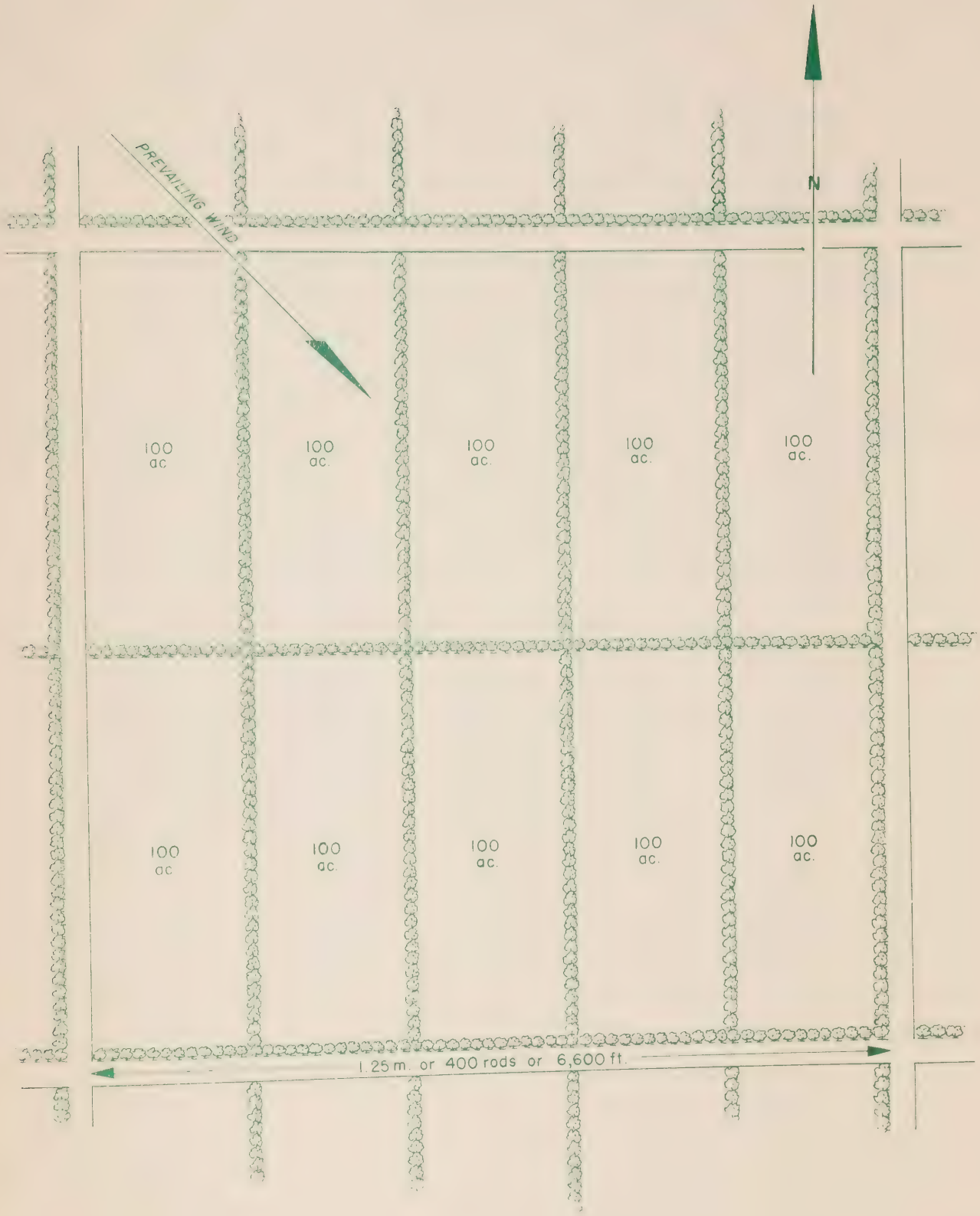
When proper species are used and windbreaks are correctly placed the effects are almost entirely beneficial. The effects may be direct or indirect, but in either case are the result of reduction in wind velocity. The effects of windbreaks on crops and cultivated fields may be listed as follows.

(a) Direct Effects

(1) Wind damage and lodging in small grains and corn is reduced or eliminated.

(2) Snow and the resultant moisture are more evenly distributed over fields, particularly on the higher spots where they are required most.

WINDBREAK PLAN
for
1,000 ACRE BLOCK



This plan shows the minimum windbreak requirements for a 1,000 acre block on level land. Woodlots and plantations will replace some of this and placement will have to be adjusted according to topography and soil on rolling land.

(3) Wind erosion of the soil is minimized.

(b) Indirect Effects

(1) Moisture loss by evaporation is reduced.

(2) Temperatures in the fields are raised; which may prevent frost damage, accelerate growth and even lengthen the growing season slightly.

(3) Erosion of the soil by water may be reduced by its more even distribution when released from snow.

The benefits of windbreaks to buildings in reducing heat loss in winter have been shown to be considerable. Experiments conducted in the United States proved that more than twice as much heat is lost from a house with a wind of 20 m.p.h. as with one of 5 m.p.h., and a windbreak can easily reduce wind velocities in this proportion. Used in this way they can often be made to form an effective back-ground for the house and a protection for farm buildings. Another advantage of windbreaks is that they provide shelter and runways for insectivorous birds and other small animals.

Belts of trees comprising one or two rows are usually called windbreaks, and with more than two rows, shelterbelts. In Southern Ontario windbreaks as a rule give sufficient protection except where wind erosion of soil on rolling land is severe, when shelterbelts may be required. On level land windbreaks may nearly always be established along existing fence lines, but on rolling land consideration should be given to the contour of the land. The prevailing winds in Southern Ontario are generally from the west, so that the greatest protection wil e derived from windbreaks on the west side, but the placement of windbreaks on the other three sides as well should be considered.

Both the height of the trees and the wind velocity influence the effective range of a windbreak. An average windbreak will reduce the ground velocity of a 20-mile wind 10 per cent or more for a distance of about 30 times the

height of the trees. About one-fourth of this effect will be felt on the windward side of the windbreak and three-fourths on the leeward side. For example, if the trees are 40 feet high the total effective range with a 20-mile wind will be 30 x 40 or 1,200 feet, 300 feet of which will be on the windward side and 900 feet on the leeward side. Generally speaking, the reduction in velocity is greatest close to the windbreak and tapers out to zero farther away. With higher wind velocities and/or higher trees the proportionate reduction and the effective range will be greater.

A few years ago European alder gained considerable popularity as a windbreak tree because it is a nitrogen-fixer like the legumes and does not rob the soil to the same extent as non-nitrogen-fixing species. At the present time stock is hard to obtain.

One consideration that should be kept in mind is that under certain circumstances windbreaks may cause air stagnation, which may increase temperature and moisture conditions to a dangerous degree in summer or increase frost damage in spring and fall on small areas, particularly in hollows. Where this is likely to occur, windbreaks should be planted so as to guide the flow of air past such spots. Where these conditions develop after the windbreaks are established they may be relieved by judicious opening up of the windbreaks.

Experience has shown that windbreaks are an asset to any farm, that their adverse effects, if any, are local and easily remedied, and that in many areas they are essential to the control of soil erosion by wind. It is therefore recommended that the Authority encourage in every way the establishment of windbreaks by private owners.

6. Snow Fences

In the climate of Southern Ontario snow drifting may cause much inconvenience and sometimes hardship. Control ca be readily effected by means of windbreaks and is dependent on

proper placing with reference to lanes of travel and topographic features.

Where space is limited or land valuable lath or board fences are frequently used, but the cost of erection, removal or maintenance of these can be materially reduced by using trees as permanent windbreaks or shelterbelts.

The object of a snow fence is to mechanically reduce wind velocity near the ground in such a manner as to cause a drift to form where it will be least harmful. The reduction in velocity creates two pools of relatively calm air, a small one on the windward side and a much larger one on the leeward side, and it is here that drifts form, leaving the area farther to the leeward free of drifts and comparatively free of snow. As winds become stronger the wind reduction and the width of the calm pool on the leeward side will increase and the centre will tend to move farther away from the windbreak.

A wide belt of trees which will accumulate a large drift of snow on its windward side may be planted right to the edge of the road, the windward edge extending back a distance equal to three or four times the height of the trees, and generally at least 100 feet.

In some places the snow trap type of windbreak is effectively used. It is composed of one or more rows of trees close to the road with a wide opening to windward and then a single row of trees. The single row arrests the first force of the wind and the snow is deposited in the opening. This has the advantage of requiring fewer trees than the shelterbelt and leaving the ground between open for cultivation in the summer.

Poor placement of windbreaks may accentuate drifting conditions. A single row of trees, unless it is a dense coniferous type, is seldom dense enough to completely stop winter wind, and may create drifts.

Any prejudice which may exist against windbreaks for protection against drifting snow on roads arises from such

poor or poorly placed windbreaks. If a windbreak has openings in it or if it ends abruptly streamer drifts will form. Windbreaks should be kept dense and tapered down at the ends by using progressively smaller species of trees and shrubs to prevent the formation of streamer drifts.

Trees are being used successfully as snow fences in Ontario by the Department of Highways, by railways and by a number of counties. Every encouragement should be given to the establishment of such snow fences in place of the removable type of lath fence now in use.

Scrubland which cannot be improved for agriculture should be returned to forest.

Removal of the forest exposes the light soils on the northern boundary to severe wind erosion.

Sawmills cannot thrive or even continue in existence without an adequate supply of timber.

CHAPTER 6

MARKETS AND MARKETING

Although no complete survey was made of the wood-using industry in the Central Lake Ontario region, even a limited investigation shows that local sawmilling has dwindled rapidly because of decreasing wood supplies. The mills which remain operate only part time and depend on custom sawing for local farmers for much of their work. At the same time industries in the towns of the area, including furniture, building material and even fuelwood firms are bringing wood from other regions rather than shop for meagre local supplies. In the absence of assured local markets, woodlot owners are discouraged in caring for the remaining woodland, thus further reducing wood supplies and exaggerating poor market conditions.

This trend can be reversed. Improvement of woodlots and planting of unproductive areas are obvious means of increasing production which were discussed in earlier chapters. In addition any woodlot owner should know enough about harvesting and marketing his products to get the most out of his present production.

The breadth of the market varies greatly with quality. For high-grade products, such as veneer logs, buyers will come one hundred miles or more. For low-grade logs, 20 miles may be the limit, and often it is difficult to find a buyer at all.

This difficulty applies to all low-grade or small material which the owner should remove to improve the growth of quality material in the woodlot. The market for fuelwood has declined sharply in the face of competition from other fuels, but this use still remains of some importance. A pulpwood market for thinnings now exists. Recent advances in the pulp and paper industry have made possible the use of hardwood thinnings. This type of market does not promise large returns to woodlot owners, but it does promise to defray the cost of woodlot improvements which will allow the progressive owner to produce the quality products from which his real profits are derived.

The importance of quality products is well illustrated by the comparisons made in a Department of Lands and Forests news release which is quoted in part below:

> "There is no commodity produced on a farm which will vary as much as wood ... Our woodlots and pine plantations in Southern Ontario yield a variety of products. In order to compare their relative values, it is necessary to arrive at a price per cubic foot of wood for each product. The following prices should not be taken as exact, as they will vary with quality, quantity, ease of logging and the bargaining power of the landowner. However, these prices will serve to show a comparison of net values from various products. Fuelwood, at $1.00 per short cord is worth about 4 cents per cubic foot. Pulpwood from pine thinnings at $2.00 per full cord is worth about 2½¢ per cubic foot. Small pine logs from 6 - 8" in diameter at 3¢ per running foot are worth about 9¢ per cubic foot. Cedar posts 8' long, having a 5" top at 20¢ each are worth about 10¢ per cubic foot. Small sawlogs 10 - 15" in diameter, of valuable species, such as hard maple, oak, ash, etc., at $40.00 per thousand board feet, Doyle Rule, are worth about 16¢ per cubic foot.
>
> "Large sawlogs of less valuable species, such as elm, beech, soft maple, averaging 20" in diameter, and valued at $25.00 per thousand, Doyle Rule, are worth about 17¢ per cubic foot.
>
> "Good quality sawlogs of hard maple, pine, oak, etc., averaging 20" in diameter at $60.00 per thousand board feet, Doyle Rule, are worth about 40¢ per cubic foot.
>
> "Veneer quality logs of maple, oak, cherry, etc., averaging 22" in diameter at $90.00 per thousand board feet, Doyle Rule, are worth 65¢ per cubic foot."

1. <u>The Timber Harvest</u>

Harvesting of timber involves four operations: estimation of volume, cutting, skidding and hauling. The owner may perform all operations, selling his logs at the mill; he may cut and skid the logs, selling them at the roadside; or he may sell his timber on the stump.

(a) <u>Estimating</u>

Estimation of timber may be done either in the tree (cruising) or in the log after cutting (scaling).

Some operators cruise timber by rough ocular estimate; that is, by walking through the bush and estimating, on the basis of past experience, the number of board feet in the stand. The most accurate method would be to measure each tree, consider taper and defect, estimate and tally its volume. In large wooded

tracts only a representative sample, say 10 per cent or 20 per cent, may be measured and the total estimated from this sample.

One example may illustrate the value of a tallied cruise. Some years ago, in competitive bidding for 87 acres of woodland, one operator estimated a stand by tallying every merchantable tree, to be 700,000 board feet; the chief log buyer for a large furniture manufacturer estimated 350,000 board feet; another operator estimated 100,000 board feet. The actual cut from the stand was 746,000 board feet. Obviously such discrepancies are of concern to the seller as well as to the bidder who tries to maintain his place in competitive buying. Before selling standing timber, it would pay the owner to make a tallied cruise or, if necessary, to hire professional assistance for this purpose.

Similarly, when selling logs, the owner or his agent should assist in their measurement, try to understand the allowance which must be made for defects and assure himself that he is being fairly treated.

(b) Cutting and Skidding

In a typical hardwood operation, the value of logs at the roadside may be half as much again as that of logs in the standing tree. The difference is mainly labour cost.

By performing the operations of cutting and skidding, the farmer increases his return by selling his labour and use of his equipment instead of just his stumpage. The flexibility of woods work in fitting into otherwise slack seasons on the farm should make this increased return particularly attractive. In addition, the farmer doing his own cutting is best able to determine that the right trees are removed and damage to the remaining stand kept as low as possible.

(c) Hauling

Truck-hauling has increased the distance from which mills can secure their logs. Cost per thousand board feet hauled

depends largely on distance. Thus while grade 1 logs might be hauled up to 50 miles, the lower value of other logs might limit practical hauling distance to 15 or 20 miles.

While actual figures will vary greatly, the example below will suggest the change in log value at various stages.

Value of logs in the tree (stumpage)	$28 per M board feet
Making logs from tree	8 " " " "
Skidding logs to road	6 " " " "
Hauling logs to mill	8 " " " "
Value of logs in mill yard	$50 per M board feet

2. Timber Sales

(a) Outright Sale of Woodlot

Frequently a sawmiller finds the simplest procedure is to buy the woodlot or farm outright. In this case, the former owner has no further interest in the land. The practice of slashing such woodlots and leaving them to become tax-delinquent is legitimate cause for community concern. Where tree-cutting by-laws are rigidly enforced, this abuse should be kept under control.

(b) Sale of Cutting Rights

Under this method the owner sells the right to cut all timber of certain species down to a certain diameter; or the trees to be cut may be marked in advance and the sale made on this basis. Often only a very vague word-of-mouth agreement is made and misunderstandings are common. A simple written agreement such as that suggested later in this chapter would avoid this confusion.

A lump-sum method of payment is often used on such sales, based upon a volume estimate by the buyer. As mentioned in the section on cruising, the volume estimates of different bidders may vary considerably. The seller is therefore advised to consult the list of buyers of woodland products in the hands of the Zone Foresters and to obtain competitive bids from as many buyers as possible. On lump-sum purchases the buyer takes all the risk as to accuracy of estimate and quality of timber.

Selling the standing timber at a rate per thousand feet removes the uncertainty of volume estimates and requires measurement of the logs after cutting. Two uncertainties remain - the log rule to be used in measurement and the assignment of logs to different grades which differ in prices per thousand board feet. For Provincial Government transactions the new Ontario Log Rule is now required, but for private sales there is no set standard, the Doyle Rule being most commonly used. The woodlot owner seldom knows the problems of processing logs into lumber sufficiently well to understand fully why the buyer assigns some logs to lower grades. Publication of price lists and grade specifications by log buyers would promote better relations with woodlot owners. Possible arguments and ill-feeling over these matters are factors in making some buyers prefer lump-sum purchase. The woodlot owner must decide whether to accept volume and grade risks in the hope of getting a better price by selling on a log measurement basis.

In the event that he chooses to be paid on a volume-removed basis, just what the buyer intends to cut and pay for should be absolutely clear. Only the best trees might be removed, and it is possible that only the best logs from these trees might be taken. This leaves the owner with many poor-quality logs which he cannot readily sell and with some poor trees standing which he wanted cut. The volume actually paid for might be small, and the woodlot owner's total realization on the transaction might be less than he would have received had he accepted payment in a lump sum.

No matter which of these two methods is chosen, a written Timber Sale Contract should cover the transaction. It should set forth all the details necessary as to prices, species, sizes, rights granted to the buyers, limiting dates, times of payment and so on.

(c) Owner-Made Logs

The woodlot owner who has decided to realize not only the value of his woodland product but also the additional

labour income derived from its harvest prefers to take payment at a price per thousand board feet for logs placed on skids at the roadway or logs delivered to the mill. Here again the securing of competitive bids and a clear understanding with the buyer regarding log grade will avoid any feeling of unfairness in the deal. An owner who simply arrives at the mill with a load of logs may feel that he has to accept the offered price even though he is dissatisfied.

3. Timber Sale Contracts

As an aid to people who are unfamiliar with timber sales agreements, a sample contract is given here. It shows the more important provisions that should be included in a contract for the sale of marked trees, to be scaled in the log. Substitute clauses are given for use in other kinds of sales. No single form of contract will suit all classes of sales, but owners of woodland timber should have no difficulty in adapting this contract to their use.

SAMPLE TIMBER SALE CONTRACT

Agreement entered into on this .....day of.....
between ..... of.....
hereinafter called the seller, and .....of...
.....hereinafter called the purchaser.
Witnesseth:

ARTICLE 1. The seller agrees to sell the purchaser, upon the terms and conditions hereinafter stated, all the living timber marked or designated by the seller and all the merchantable dead timber, standing or down, estimated to be ..... board feet, more or less, on Lot ..... Con. ..... in the Township of .....County of ..... and located on a farm owned by the seller and about ..... miles from .....

ARTICLE II. The purchaser agrees to pay the seller the sum of ..... more or less, as may be determined

by the actual scale, at the rate of ..... per thousand feet.....
.....
.....
payable prior to the date of removal of material, in instalments of ..... each.

ARTICLE III. The purchaser further agrees to cut and remove said timber in strict accordance with the following conditions:

1. Unless an extension of time is granted all timber shall be cut, paid for, and removed on or before .....
.....

2. Saw timber shall be scaled by the ..... log rule, and measured at the .....
.....

3. The maximum scaling lengths of logs shall be 16 feet; greater lengths shall be scaled as two or more logs. Upon all logs an additional length of 4 inches shall be allowed for trimming. Logs over-running this allowance shall be scaled not to exceed the next foot in length.

4. No unmarked timber of any kind shall be cut, except
.....

5. Stumps shall be cut so as to cause the least possible waste - stumps of trees up to 16 inches in diameter, not higher than 12 inches above the ground, and those of trees above this size at a distance above the ground not greater than three-fourths of their diameter.

6. All trees shall be utilized in their tops to the lowest possible diameter, for commercially saleable material.

7. Young trees shall be protected against unnecessary injury; only dead trees and less valuable kinds may be used for construction purposes in connection with lumbering operations.

8. Care should be exercised at all times by the purchaser and his employees against starting and spreading of fire.

ARTICLE IV. It is mutually understood and agreed by and between the parties heretofore mentioned as follows:

1. All timber included in this agreement shall remain the property of the seller until paid for in full.

2. In case of dispute over the terms of this contract, final decision shall rest with a reputable person to be mutually agreed upon by parties to this contract, and in case of further disagreement, with an arbitration board of three persons, one to be selected by each party to this contract, and a third to be the Zone Forester or his chosen representative.

In witness whereof the parties hereto have hereunto set their hands and seal this ..... day of ..... 19.....

Witnesses:

....

....

The following are sample clauses that should be substituted in the contract when other methods of sale are used. In lump-sum sales substitute in Article I a descriptive clause modelled on this one:

All merchantable living trees, except .....
.....which measure 12 inches or less in diameter at breast height (a height of 4½ feet above the ground).

Such provision will reserve the basis of a second crop consisting of the more valuable and rapid-growing kinds of trees and remove all the inferior and slower-growing trees.

The payment clause in lump sum sales should be varied to read somewhat like this:

The sum of ..... dollars for said timber, payable prior to the cutting of the material, in instalments of ..... dollars each, payable on or before .....
..... respectively.

4. Attempts at a Solution of the Marketing Problem

Orderly marketing of woodland products is to the advantage of the woodlot owner, the sawmill operator, and the ultimate industrial consumer who requires definite quantities of certain species in certain grades to carry on his manufacturing business. It has already been remarked that the farmer feels at a disadvantage in marketing logs, and his real or imagined grievances are a detriment to good relations between the buyer and seller of logs and a steady flow of logs to the market. The following attempts at improved marketing may suggest methods which could be applied in the Central Lake Ontario region.

(a) A Marketing Experiment near Doon

During the winter season of 1948 and 1949 the Department of Lands and Forests in the Galt Zone carried out an experiment in the marking and marketing of timber in an 18-acre woodlot near Doon. The project was initiated by Mr. I. C. Marritt, the District Forester, and the field work was done by Mr. L. S. Hamilton, Zone Forester. The scheme is patterned after a marketing assistance method meeting good success in the State of New Jersey.

The mixed uneven-aged woodlot contained considerable large white pine and red oak. Initial investigations by the Department showed growth stagnation due to over-stocking and recommended the removal of certain trees representing the accumulation of growth over a number of years. Under this condition, removal of selected trees allows the remaining trees to grow at an increased rate. As growth again slows down, another cropping should take place. This is the simple principle of selective logging - the removal of accumulated growth periodically to keep the stand at a healthy, productive growth rate.

Upon explanation of the proposed marketing assistance, the woodlot owner entered into a signed agreement with the Department as a co-operator, agreeing not to sell or allow to be cut any trees except those marked, upon penalty of a nominal fine

per thousand for the estimating and marking service of the Department.

The trees were marked with a view to a second marking which would be necessary afterwards to remove weed trees and trees of low value in order to give good growing conditions. Each tree marked for removal was blazed at breast height and below stump height, the stump blaze being branded to detect any unauthorized cutting. The total log scale estimated for the 223 trees marked was 47,600 board feet, Doyle Rule. The trees were listed as to species and diameter on a mimeographed form.

All the estimation data were turned over to a timber agent chosen by the Department. The timber agent entered into a written agreement with the owner to -

(1) solicit tenders from buyers:

(2) draw up a timber sale contract protecting the owner;

(3) check on cutting operations; and

(4) measure and collect payment for all wood cut before its removal from the property.

The agent was to receive a percentage commission of the gross sale value.

The timber agent mailed the volume estimate sheets to all local log buyers, giving location of the woodlot and inviting inspection of the bush.

The timber sale contract set forth the prices agreed upon for the different species, required that tops be worked into 4-foot wood to be paid for at an agreed price per standard cord, provided penalties for the cutting of unmarked trees and required that the woods operation be conducted with a minimum of damage to the woodlot.

Prices realized by the owner were much better than the average paid in the area. Prices per thousand board feet, Doyle Rule, for the standing timber were:

White and red oak	$62
White ash, soft maple, hard maple, basswood and cherry	$60
White pine	$55
Hemlock	$45
Beech	$30
Fuelwood	$4 per standard cord.

The experiment was considered very successful by all the parties concerned, yielding about 2,000 board feet more than estimated, and the woodlot has been left in fine growing condition with an expected second cut in 15 or 20 years of 25,000 board feet.

(b) The Lanark County Co-operative

This co-operative was set up by a group of woodland owners in the County of Lanark in March, 1950. Its objectives are the better management of privately-owned woodland to ensure a continuous yield of the best material possible from the forested land of the members through profitable marketing of all the woodland products.

To put the woodland enterprise on a paying basis to the individual, it is necessary to market not only the material suitable for lumber manufacture and special products such as veneer but also the inferior products such as the poorer hardwood species, low-grade hardwood logs of the better species, small softwood products such as cedar posts and poles and that material removed in improving a woodlot during what may be called sanitation cutting. It was felt that the advantages of co-operative action by woodland owners in the field of marketing would best solve the problems of the individual, particularly in respect to inferior or small products. Acting as a group rather than individually and through a member active in contacting prospective buyers, they can hope for recognition by the buyers in the area as a stable source of the various woodland products.

The establishment of the co-operative followed an extensive educational campaign carried on by fieldmen of the Federation of Agriculture, the Department of Lands and Forests and the local Farm Forum leader. Interest was aroused through moving pictures, talks at schools, local evening meetings, press releases, radio programs and public speaking competitions on woodlot management. Meetings held at Lanark were attended by officers of the Department of Lands and Forests; representatives of pulp and paper companies, sawmills and other wood-using industries; and members of agricultural organizations. Gradually a workable plan was evolved, and the Lanark Forest Co-operative was set up under a number of directors with Mr. Herb. Paul as manager.

Mr. Paul, of Lavant, the main force behind the formation of the co-operative, is an energetic leader of the local Farm Forum, caretaker of the Lanark County Forest, a farmer, and owner of several hundred acres of woodland in Lavant Township. As manager of the co-operative his duties entail the location of markets for the woodland products of the members, arriving at satisfactory price schedules, collection of payment for products, ensuring that products are ready or delivered at the time promised and advising members on cutting their woodland according to best forestry practices.

The co-operative had a membership of approximately 60 in the fall of 1950. By April of 1959 the membership had grown to about 250 with an average holding per member of about 200 acres. A lifetime membership fee is $5.00 and in addition the co-operative receives a commission of 5 per cent of the sales. An indication of the success of this venture is the fact that the co-operative has accumulated enough funds to make advances to producing members while wood or logs are being manufactured.

At present the co-operative has no intention of undertaking a manufacturing endeavour such as a sawmill for lumber or railway ties. Logs are not accumulated at a central point and sorted as to species and a grading standard, but are handled

direct from woodland to buyer. The purchaser's measure of the volume, by grade where it might apply, is accepted as the basis for payment on transactions.

In addition to its main function of promoting forest conservation and finding markets at the best prices for forest products, the co-operative has other activities. Since 1954, with financial aid from two prominent pulp and paper companies, the co-operative has sponsored a woodlot management competition among its members. Winners in the competition are honoured at an annual banquet and given framed certificates and cash awards. In 1956 the co-operative formed a tree farm committee in Lanark County and this project has resulted in twenty-five woodland owners being certified as tree farmers by the Canadian Tree Farm Committee. At present the co-operative is planning to purchase an area of 50 to 100 acres and develop it as a demonstration woodlot.

It would seem that the Lanark Forest Co-operative has progressed a long way toward accomplishing its objectives of promoting the better management of privately owned woodland and of benefiting its members through profitable marketing of all woodland products. Such an organization not only promotes good conservation practices but also benefits the economy of the community. It is recommended that the Central Lake Ontario Conservation Authority encourage its woodland owners in the formation of a similar co-operative, and give its full support and co-operation to such an enterprise.